

THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD



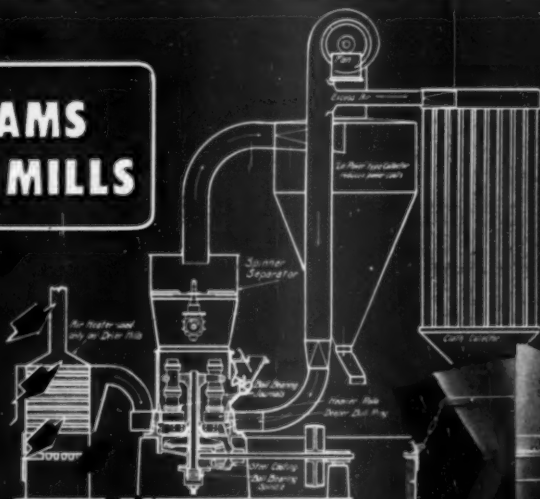
WAYNE LAKES PARK

Rehabilitation of worked over deposits
to benefit public an integral part of
American Aggregates Corp.'s operations

ANNUAL REVIEW and DIRECTORY ISSUE

For those Fine Grinding Jobs . . .

WILLIAMS ROLLER MILLS



Blueprint illustration—
Williams drying,
grinding and
separating unit.

let's look at the record

LIMESTONE

Many Williams Roller Mills are satisfactorily grinding limestone to 99% 325 mesh or 85% 200 mesh and for all other commercial uses finer than 40 mesh.

LIME

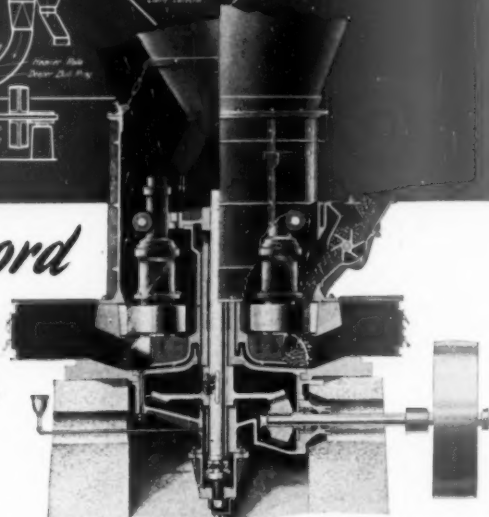
Both burned and hydrated lime can be satisfactorily processed in Williams Roller or Impact Mills. Automatic throw-out rejects impurities and unburned cores. Dustless operation.

CLAYS, TALC, KAOLIN

Can be reduced to any fineness from 40 mesh to micron sizes. Impurities removed by automatic throw-out.

DRY AND GRIND SIMULTANEOUSLY

Simply by introducing hot air, all sizes dry as they grind eliminating the need of separate drying equipment.



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

WILLIAMS ALSO MAKES . . .

Heavy-duty hammermills for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
800 ST. LOUIS AVENUE ☆ ST. LOUIS 6, MO.

WC49-11PQ

WILLIAMS

CRUSHERS

GRINDERS

SHREDDERS



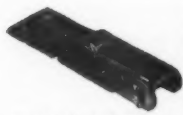
no ONE chain serves every purpose



Link-Belt Drag Chain Conveyor, employing a single strand of H-480 Promal chain, handling 150 tons per hour of ground limestone. Here the right chain for a specific job means more efficient performance, reduced operating costs.

LINK-BELT offers the RIGHT chain for every job...engineered to meet your requirements

Typical chains from
the complete Link-Belt line



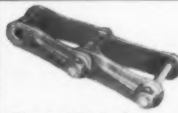
Class SS bushed roller chain with straight sidebars—for practically any conveying or elevating service.



Class C combination chain—popular, durable, low cost design for elevators, conveyors.



Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.



Class 800 ley bushed chain—for heavy duty, severely abrasive conveying and elevating.

Link-Belt offers no single "cure-all" chain to handle every job. From the most complete line of chains and sprockets in the world—we can recommend the *exact* type to fit your particular job requirements—cast, combination, forged, SS, roller or silent. So, whatever your chain problems, big or small, Link-Belt engineers will work with you or your consultants to help solve them.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in principal cities.

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LINK-BELT

CHAINS AND SPROCKETS



Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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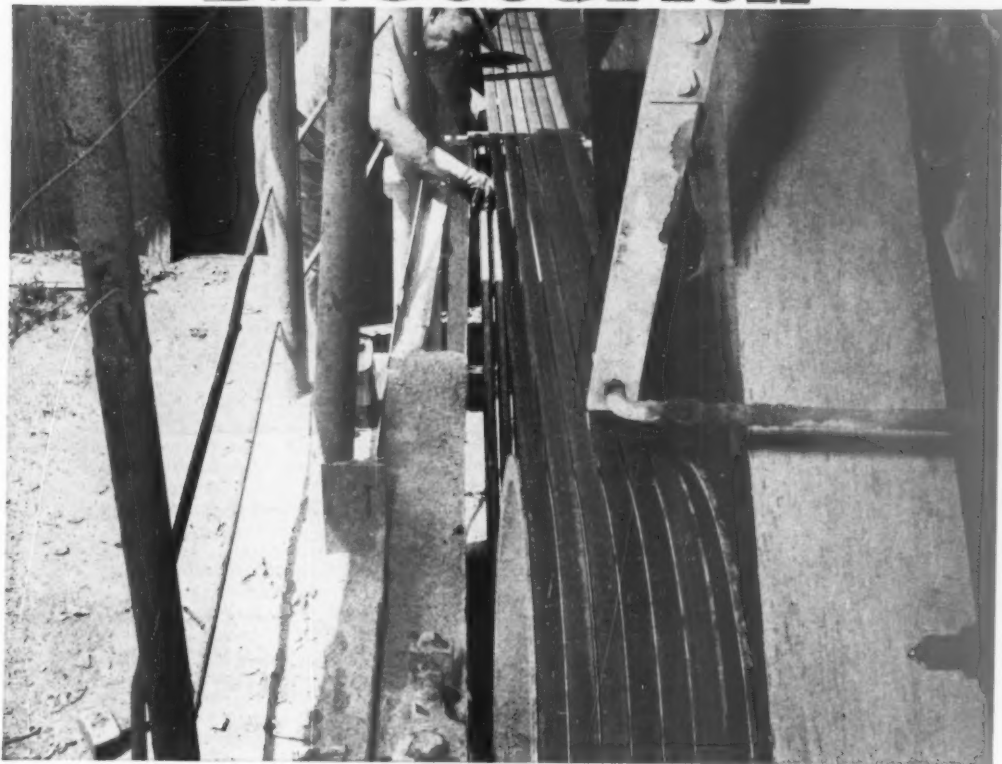
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RESEARCH KEEPS

B.F. Goodrich

FIRST IN RUBBER



Where failures meant shutdowns they changed to grommet V belts

B. F. Goodrich grommet V belts cut costs 20 to 50%

POWER transmitted here drives a rock crusher 8 hours a day, 5 days a week. When the drive stops, rock crushing stops and the plant shuts down. Previous V belts suffered from shock loads, wore out fast. A BFG man recommended the grommet V belt to stand the jerks and hard pulls. The grommet V belts shown here have been in service 2 years, with no shut-offs or shut-downs for maintenance. Here's why the grommet V belt lasts 20 to 50% longer:

No cord ends—A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur

in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength—All of the cord material in a B. F. Goodrich grommet multiple-V belt is concentrated in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip—Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give $\frac{1}{3}$ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,253,294). At present made in C, D and E sections only. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.

Grommet V Belts BY
B.F. Goodrich
 RUBBER FOR INDUSTRY

TIMKEN® alone offers all 3 rock bit types



and a complete Rock Bit Engineering Service!

HAVING rock bit troubles? If you think your unit bit cost or cost per foot of hole is too high—or drilling is too slow—get the help of the Timken Rock Bit Engineering Service *now*. Only Timken® rock bit engineers have *all three* types of bits to choose from:

1 **MULTI-USE**—gives lowest cost per foot of hole when full increment of drill steel can be drilled and when control and reconditioning of bits are correct.

2 **CARBIDE INSERT**—for extremely hard and abrasive ground. Drillers spend less time changing bits.

3 **ONE-USE "SPIRALOCK"**—for use where reconditioning is impractical or undesirable. Lowest unit cost. Has revolutionary new "Spiralock" union.

Timken rock bit engineers are the world's largest

field organization devoted exclusively to rock bit problems. They've been helping to solve those problems for more than 17 years and their research leads the field.

FREE BOOKLET! Illustrations and detailed descriptions of the full line of bits. Information on engineering service. Write to The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



TIMKEN

... your best bet for the best bit
... for every job

THIS *Simplicity of Design* means lower cost in the Pit!

Look at that deck! Only two main shafts! Few gears! A direct line of power and all operating mechanism back of the center pin.

Cast Steel Machinery Side Frames maintain rigidity and shaft alignment, reducing wear that would result from weaving.

Ball and Roller Bearings on all high-speed shafts reduce friction to a minimum. Clutches are large and cool running. Lubrication and upkeep is easy.

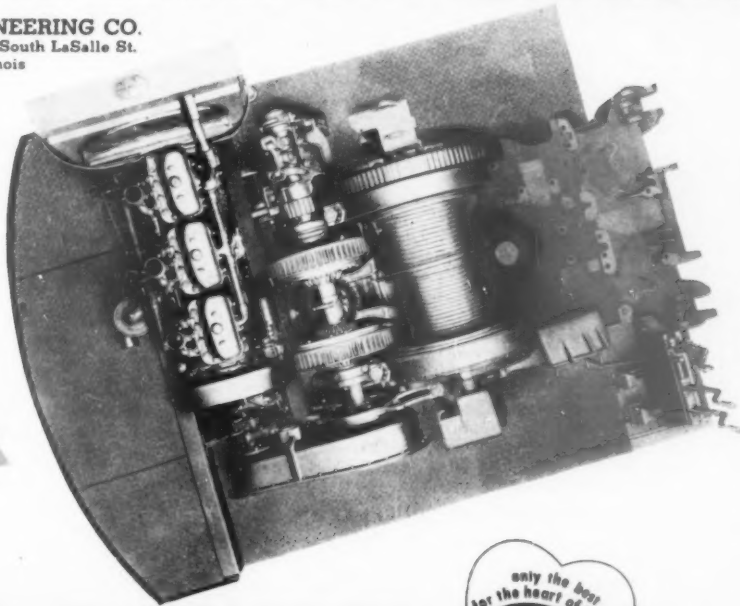
Simplicity of Design means money. It encourages upkeep and reduces "down time." This is just another of the many Northwest advantages that makes it a better Rock Shovel.

Ask Northwest Owners. There is a good reason why one out of every three Northwests sold is a repeat order in the heart of the job. You can't afford anything but the best for the *Key Spots*.

You can plan ahead to have a Northwest. Let us tell you how.

NORTHWEST ENGINEERING CO.

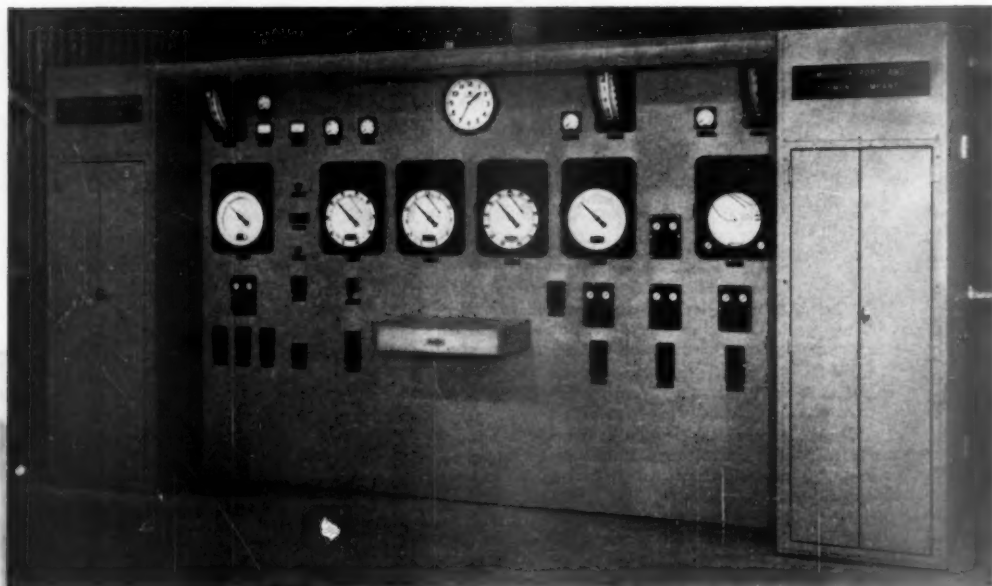
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NORTHWEST

Convertible for any Mining, Material Handling or Excavation Problem





Main Panel Board for control of 3000 bbl per day Kiln
at Missouri Portland Cement Company, St. Louis, Missouri.

*3 Ways
Better*

...Bailey Control for Rotary Kilns

Bailey Control for Rotary Kilns gives you better performance three ways:

1. Economical Operation
2. Uniform Quality of Product
3. Reduced Maintenance

These are advantages which can be achieved when all phases of kiln operation are coordinated to work together as a team. Here's how Bailey Kiln Control can help you get all three.

ECONOMICAL OPERATION

With Bailey Combustion Control you can be certain that you are getting maximum product for every unit of fuel you burn. Bailey Control closely guards the Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and the Temperature of Air for Combustion.

UNIFORM QUALITY OF PRODUCT

Bailey Instruments and Controls can help you achieve a

uniform high grade product. Measurements of temperatures, kiln speed, combustibles content, and oxygen content can be transmitted to recorders on centrally located control boards like the one shown. There is no sacrifice of accuracy or speed of response. High temperature alarm contacts may also be provided with Bailey Pyrometers as a further aid in achieving optimum uniformity of product.

REDUCED MAINTENANCE

By maintaining uniform temperatures and excess air conditions in the kiln, Bailey Controls help to reduce to a minimum costly refractory repairs and wear and tear on auxiliary equipment.

Bailey Meter Company has a staff of engineers who are experts in the control of rotary kilns. Assure yourself of optimum kiln performance. Let one of these men help plan your Kiln Control System.

P-22

BAILEY METER COMPANY

1039 IVANHOE ROAD

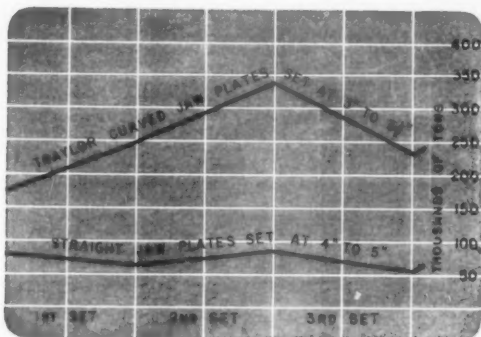
CLEVELAND 10, OHIO

Controls for Processing

TEMPERATURE
PRESSURE
% OXYGEN
% COMBUSTION

FLOW
LEVEL
DENSITY
RATIO

Traylor Curved Jaw Crusher Plates outlast ordinary plates almost 3 to 1



This chart is based on actual records kept on a 36" x 48" jaw crusher. Operating at a setting of 4" to 5", the average life of straight jaw plates was 96,500 tons. When fitted with Traylor smooth-faced, curved jaw plates, this same crusher averaged 276,724 tons per set . . . at a setting of 3" to 3½". Plate life was increased almost 3 to 1!

No choking . . . no packing . . . stops power waste. Crushing force is used with greater efficiency to produce a more uniform product with fewer waste fines.

Traylor Curved Jaw Crusher Plates . . . standard equipment on all Traylor Jaw Crushers . . . can be installed in many other crushers to transform them into modern, up-to-date primary breakers. Traylor's Curved Crushing Surfaces cut costs of primary stone reduction in many ways . . . outlast ordinary plates as much as 3 to 1. If you want to increase the efficiency of your plant, investigate Traylor Curved Jaw Plates today.

Traylor

Rotary Kilns, Coolers and Dryers • Grinding Mills
Jaw, Reduction and Gyratory Crushers • Crushing Rolls

MAIL COUPON
to get full details.

TRAYLOR ENGINEERING & MANUFACTURING CO.
307 MILL ST., ALLENTOWN, PA.

I want to see how easily Traylor Curved Jaw Plates can be installed in my present crusher.

Name _____
Company _____
Address _____

SALES OFFICES: New York, N.Y.; Chicago, Ill.; Los Angeles, Calif.
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

A "TRAYLOR" LEADS TO GREATER PROFITS

MATERIALS HANDLING

There's a Continental Conveyor for every industry.

When you have a conveying or elevating problem, specify

Continental



STEAM GENERATING PLANT



FERTILIZER PLANT



COTTONSEED OIL MILL



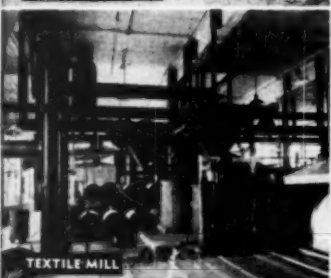
GRAIN HANDLING



FEED MILL



COAL MINE



TEXTILE MILL



CEMENT PLANT



QUARRY

BELT CONVEYORS, SCREW CONVEYORS, APRON CONVEYORS, BUCKET ELEVATORS
PLATE OR APRON FEEDERS, TRIPPERS, BELT BRUSHES, PULLEYS, SPROCKETS AND CHAIN
PILLOW BLOCK, BELTING, SPEED REDUCERS, POWER TRANSMISSION EQUIPMENT
FABRICATED STEEL, MECHANITE CASTINGS, SPECIAL MACHINE WORK

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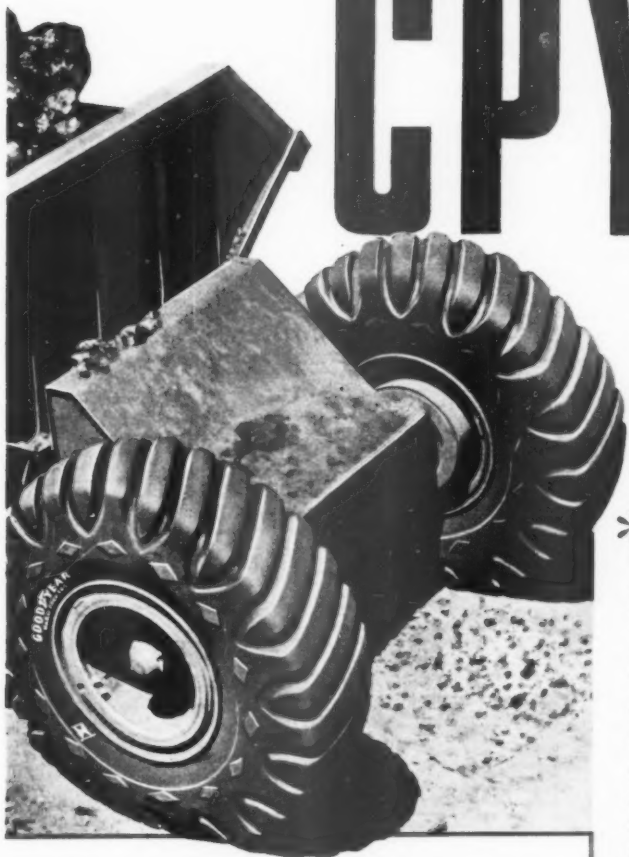
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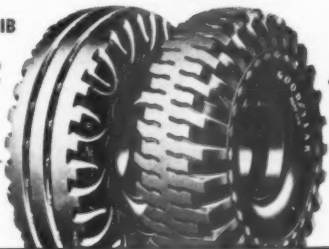
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tells you why
it pays
always to
BUY and SPECIFY
Goodyear



HARD ROCK RIB

Companion tire for front wheels in rock work—easier steering, smooth rolling, same tough cord body, same rugged shoulder and sidewall as Hard Rock Lug.



ROAD LUG

Remarkable dual-purpose tire operates both OFF and ON the road. Combines off-the-road toughness and traction with on-the-road mileage and economy.

Road Lug—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio



Cost per yard—the all-important factor that determines your profits. The deciding factor that makes and keeps Goodyear tires the First Choice of profit-minded quarry operators!

Outstanding example: Goodyear's famous Hard Rock Lug—super-tough champ for all types of rock work. Extra-thick undertread protects its extra-tough carcass against bruising—extra-heavy tread and sidewalls are armored by massive lug bars against cuts and rips—self-cleaning tread provides top traction.

All these extras add up to extra-low CPY—so much lower cost per yard, in fact, that operators find that Goodyear's Hard Rock Lug has no equal for cutting costs on tire-killing rock work.

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND

ROCK PRODUCTS, January, 1951

Check YOUR output against

HAUL one way	TRIPS per hour (per unit)	PAY YARDS per hour (per unit)	Name of Owner	Job Description	Type of Material	Job Conditions
50'-100'	31	310	Mass Construction Co. Paris, Ill.	2 C Tournapulls leveling 140,000 yds. for Logan County Airport at Lincoln, Ill.	Common earth and clay.	No established haul roads due to scattered grading. Occasional heavy rains.
150'	Not measured	125 self-loaded	Griego County Soil Conser- vation District, Cooperstown, N. D.	1 D Roadster digs 210 yd. drainage ditch near Anita, N. D.	Sandy loam.	Normal.
175'	35	90 self-loaded	Griego County Soil Conser- vation District, Cooperstown, N. D.	1 D Roadster digs drainage ditch on farm near Cooperstown, N. D.	Black loam.	Typical drainage ditching.
200'	42	450	Elmer Anderson, Contractor Lyle, Minn.	2 C Tournapulls on 149,000 yd. Stevens County road job south of Alberta, Minn.	Loam and clay.	Average.
200'	30	150 self-loaded	Ray Jones, Contractor Ipswich, S. D.	1 D Roadster building series of 1500 yd. soil conservation dams in Edwards County Schedule includes one dam per day.	Sandy clay and gravel.	Material sun-baked, extreme- ly dry.
200'	25	137.5 self-loaded	Ray Kahl, Contractor Springfield, Ohio	1 D Roadster grading 45,000 yds. for indus- trial plant site at Yellow Springs, Ohio.	Mostly loam, clay; with occasional gravel.	Good weather, level grades.
325'	15	176.5	Estreiros Teanico C. F. Barcelo e Henri, Sao Paulo, Brazil	3 C Tournapulls grade 1,045,000 yds. for new Sao Paulo government housing project in Caxambu, Brazil.	Heavy, wet clay.	Continuous tropical rains soak material, wet working time to 8 days a week.
300'-400'	22.9	125 self-loaded	C. H. Wilhelm, Contractor Faukton, S. D.	1 D Roadster on soil conservation dam near Faukton, S. D.	Dry, sandy clay.	Hard material grades on return haul.
300'-500'	20	120 self-loaded	William Clander, Contractor Clemson, Mich.	1 D Roadster levels 25,000 yd. subgrade for 510-home Royal Oak subdivision near De- troit, Mich.	Topsoil and clay.	Tight quarters . . . hauling and spreading a m o n g houses and foundations.
425'	20	80 self-loaded	Democratization for Cleburne County Highway Dept., Heflin, Ala.	1 D Roadster on county road improvement near Heflin, Ala.	Hard, rocky clay.	Tough material required road- ing, loaded with high voids.
500'	24	Not measured	Orlean Construction Co. Philadelphia, Pa.	2 D Roadsters on 450,000 yd. leveling for Lyonswood Gardens housing project, Phila- delphia, Pa.	Sand, topsoil.	Up 20% approach grade to top of stockpile.
500'	17	170	John F. Walter, Contractor Pawlet, Mich.	2 C Tournapulls build settling area for sepa- rator disposal system at Camp Grayling, Mich.	White Michigan sand.	Very loose, very abrasive material.
500'	14.25	150	Anderson Bros. Richford, Ill.	1 C Tournapull on 100,000 yd. levee to pro- tect coming plant site at Mendota, Ill.	Sticky clay and topsoil.	Mud road often 12" deep in water.
550'	16	176	Vernie Jurl, Contractor Gresham, Ore.	3 C Tournapulls on 5 1/2 mile, 410,000 yd. relocation of Rt. 101 near Tillamook, Ore.	Sand, gravel, hardpan, clay, and loamy top- soil.	Material saturated by con- stant heavy rainfall.
600'	20	200	R. V. McElroy Construction Deater, Ill.	1 C Tournapull on 663,000 yd. bridge ap- proaches and relocation of U. S. 40 near Greenup, Ill.	Hard-packed clay.	Returns 200' up 21% grade to cut.
600'	20	200	Isbell Construction Co. Boca, Nev.	2 C Tournapulls on 17.6 mi., 314,000 yd. road construction near Elko, Nev.	Mixed sandstone, clay, loam.	35% return grade. 4500' al- titude.
600'	13	117	Central Waterways Irriga- tion & Navigation Com. New Delhi, India	2 C Tournapulls on 35,000,000 yd. Mirakot Dam across Mahanadi River in India.	Hard, rocky clay.	300' of 20% grade. Very rough haul road.
600'	11	135	Heley, Chisholm and Morris Construction Co. Charlottesville, Va.	1 C Tournapull on 1,290,000 yd. expansion of railroad yard at Russell, Ky.	Loose, dead sand.	Tough-loading material. Un- stable haul road.
650'	23.5	235	Mass Construction Co. Paris, Ill.	2 C Tournapulls leveling 140,000 yds. for Logan County Airport, Lincoln, Ill.	Common earth and clay.	No established haul roads. Very heavy rains.
660'	17.6	Not measured self-loaded	Stephen & Ivier, Inc. Hazel Park, Mich.	4 D Roadsters move 450,000 yds. for new race track near Detroit, Mich.	Topsoil.	Precision spreading.
700'	15	75 self-loaded	Sarason Bros. Murray, Utah	1 D Roadster load-levels 15,000 yds. at Jeremy Ranch, Salt Lake City, Utah.	All clay.	Slough haul roads.
700'	13	117	Schultz and Lindsay Fargo, N. D.	2 C Tournapulls on 380,000 yd. Riverside, N. D. - housing project for Garrison Dam workers.	Sandy clay and loam.	Normal.
700'	15	150	B. G. Young & Son Johnson City, Tenn.	2 C Tournapulls grade 130,000 yds. for air- port at Greenville.	Common earth.	Haul up 4% grade.
650'-750'	10	100	Peterson Bros. Tasso, Miss.	2 C Tournapulls strip 65,000 yds. of overbur- den from gravel pit at Crenshaw, Miss.	Sticky, wet clay, loam.	"Shut-downs" weather condi- tions. 250' haul up 12% grade, 310' over sub - deep, soft fill.
800'	18	180	Isbell Construction Co. Boca, Nev.	2 C Tournapulls on 17.6 mi., 314,000 yd. road construction north of Elko, Nev.	Sand, loam.	7% adverse grade on return. 4500' altitude.
800'	14	84	Nappa Construction Co., Inc. Riverside, Calif.	2 D Roadsters grade 90,000 yds. for new housing project at Van Nuys, Calif.	Sandy loam.	Average.
850'	7	Not measured	Henry Thygesen, Contractor Albuquerque, N. M.	1 C Tournapull on highway construction near Belen, N. M.	Loose, powdery blow- sand.	Cuts sprinkled to green load- ing. Loose footing all the way.
800'-1000'	7	77	Vernie Jurl, Contractor Gresham, Ore.	3 C Tournapulls on 5 1/2 mile, 410,000 yd. relocation of Rt. 101 south of Tillamook, Ore.	Sand, gravel, hardpan, clay and topsoil.	Material saturated by heavi- est rainfall in U. S.
950'	16.5	90 self-loaded	Ray Kahl, Contractor Springfield, Ohio	1 D Roadster grading 45,000 yds. for new industrial plant in Yellow Springs, Ohio.	Loam, clay, gravel in spots.	Haul grades up to 10%.
1000'	11.5	115	Gross Construction Co. Osburn, Ind.	2 new C Tournapulls, 5 Super C Tournapulls. Built 300,000 yd. airport at Greensboro, N. C. 165 days ahead of schedule.	Heavy, water-logged clay.	October rains made job un- workable for all units ex- cept new Tournapulls.
1000'	16	144	"Burmovers" Minneapolis, Minn.	2 C Tournapulls grade 45,000 yd. addition to Wald Chamberlain Airport, Minneapolis.	High-void sand, topsoil.	Normal . . . material dry.
1100'	9	104	Cia. Asuadora Verticotes, Cruces, Cuba	4 C Tournapulls on 170,000 yd. earthfill dam in Central Estrella, Cuba.	Hardpan, clay, and sand.	Haul up 3 to 25% grades.

LETOURNEAU



TOURNAPULLS

PROVED BY 13 YEARS OF RUBBER-TIRED TOURNAPULL PERFORMANCE

these **TOURNAPULL** JOBS

HAUL one way	TRIPS per hour (per unit)	PAY YARDS per hour (per unit)	Name of Owner	Job Description	Type of Material	Job Conditions
1100'	13.3	70 self-loaded	Lawrence County Highway Dept. Moulton, Ala.	1 D Roadster on 11 miles of new farm-to-market road near Moulton, Ala.	Typical Alabama red clay.	Average conditions.
1100'	17	104	Lawrence County Highway Dept. Moulton, Ala.	1 D Roadster pusher-loaded on same Moulton road job.	Alabama red clay.	Average conditions.
1200'	15	150	Caraboe Construction Co. Toccoa, Ga.	3 C Tournapulls build 374,000 yd. fill across shallow lake for Central Florida through highway near Maiten City.	Loose, hard-loading sand.	Haul 600' over sand, 600' over new road bed.
1200'	10	50 self-loaded	Shelton & Pryoringer Construc- tion Co. Columbus, Ohio	1 D Roadster used as bulking tool on 16-mile, 178,000 yd. subgrade for U. S. 38 in Cran- ford and Wrentham Counties, Ohio.	Tapiell, clay and silt.	Load around poles, caissons, shale haul road with rock trucks, other traffic.
1250'	14	84	Hutchinson & Wyatt Sandyville, W. Va.	2 D Roadsters extend railways of Kanawha County Airport, Charleston, W. Va.	Red-hard, iron-baked clay.	Extremely dry, tough ma- terial.
1250'	12	125	Haley, Chisholm & Morris Construction Co. Charlottesville, Va.	1 C Tournapull on 1,200,000 yd. railroad yard expansion at Russell, Ky.	Loose, abrasive sand.	Rough, pitted haul.
1250'	9	103.5	Anderson & Davenport Springfield, Ill.	2 C Tournapulls on 155,000 yd. grading for Mordale Airport near Carbondale.	Sandy loam.	Ideal weather, material; but rough haul roads.
1400'	10	105	Haley, Chisholm & Morris Construction Co. Charlottesville, Va.	1 C Tournapull on 1,200,000 yd. expansion of railyard at Russell, Ky.	Sand.	Fitted, narrow haul road.
1500'	20	200	Peterson Bros. Yocco, Miss.	2 C Tournapulls strip 65,000 yd. of over- burden from gravel pit at Crestview, Miss.	Common earth, clay.	Up 13% grade for 250' and otherwise excellent haul roads permitting travel in 4th gear.
1600'	9.5	114	A. F. Schum, Contractor LaCrosse, Wis.	1 C Tournapull on 120,000 yd. overpass fill for U. S. 12 and 18 near Madison, Wis.	Swamp sand.	Material loaded under wa- ter, hauled up 4 to 8% grades. Poor loading.
1600'	17.5	105	Sagden & Sicker, Inc. Hazel Park, Mich.	4 D Roadsters grade, build 450,000 yd. road track near Detroit, Mich.	Fill 9" sand, 8" clay, 3 1/2" topsoil and clay.	Precision spreading, banking on trash. Travel through trucks on paved roads.
1700'	10	50 self-loaded	Sam Glasgow, Contractor Glenside, Pa.	1 D Roadster, leveling industrial plant site in Philadelphia, Pa.	Sandy clay.	Average conditions.
2000'	9	108	Helle L. Year Co. Berkham, N. C.	4 C Tournapulls build 450,000 yd. 1100' embankment across tidal swamp on U. S. 52 between Washington and Annapo- litis, Md.	Ocean silt and sand.	Steep cuts. Material dumped to displace soft swamp muck.
2350'	8	36 self-loaded	Demonstration for Cleburne County Highway Dept., Heflin, Ala.	1 D Roadster on cut and fill work for sec- ondary road near Tuscaloosa, Ala.	Common earth.	Normal.
2400'	8.2	78	Mason Bros., Inc. Moorhead, Minn.	3 C Tournapulls rebuilding 370,000 yd., 12.3 miles of Hwy. 81 north of Shelby, Minn.	Tough, sticky gums.	Haul over rough, s o g g y roads.
2625'	14.3	163.5	Rogelio Vlasco, Contractor Mexico City, Mexico	2 C Tournapulls widen embankment for spur rail line to Pomas Edmundo, Atzacapotzaco, Mexico.	Compacted topsoil.	Hard, dry material.
2640'	10	60	W. B. Bennett Paving, Ltd. Oshawa, Ontario	2 D Roadsters handle 9,000 yd. subgrade for city street in Oshawa, Ont.	Sandy clay mixed with small stones and old road-surfacing material.	Load around man holes, gas lines in street. Haul 1/2 mi. through traffic on a d cross busy intersections.
3000'	7	70	R. V. McElroy Construction Co. Becraft, Ill.	1 C Tournapull on 663,000 yd. relocation of U. S. Hwy. 40 near Greasop, Ill.	Hard-packed clay.	Before 400' up 17 to 21% grades. Spongy fill.
3200'	7	42	Chippewa County Highway Dept. Chippewa Falls, Wis.	3 D Roadsters on 180,000 yd. relocation of Highway 16 in Chippewa County, Wis.	Glacial sand.	Abrasive materials. Level haul.
3100'-3350'	6.4	32 self-loaded	Griggs County Soil Conser- vation District Coopersville, N. D.	1 D Roadster repairs township road in Griggs County, N. D.	Hard, dry clay.	Milly.
3750'	10	100	Wylie Brothers Albion, N. M.	3 C Tournapulls handle 85% of 163,000 yd. highway job east of Hobbs, N. M.	Sandy clay.	Haul 500' across field, make sharp turn on to highway, travel 2350' in traffic.
3500'-4000'	7.5	82.5	Helle L. Year Co. Berkham, N. C.	4 C Tournapulls build 450,000 yd. 1100' embankment across tidal swamp for relocation of U. S. 52 between Washington and Annapo- litis, Md.	Ocean silt and sand.	Steep cuts. Material spread on soft swamp fill to dis- place muck.
4000'	8	80	R. V. McElroy Construction Co. Becraft, Ill.	1 C Tournapull on 663,000 yd. relocation of U. S. Hwy. 40 near Greasop, Ill.	Clay.	Before 400' up 17 to 21% grades. Spongy fill.
4000'	5	35	Hest Brothers Greenville, Tenn.	1 D Roadster filling in between foundation walls and columns of tobacco warehouse at Greenville, Tenn.	Extremely hard, dry clay.	Load, dump in narrow lanes between warehouse walls, columns.
4400'	5	22.5 self-loaded	Boss County Highway Dept. Madison, Wis.	3 D Roadsters improve city streets in Troy, Wis.	Sand, gravel.	Haul through traffic. Spread in soft mud holes.
4500'	5.5	60.5	G. F. Toff, Contractor Northville, Mich.	2 C Tournapulls handle final grading on 1,000,000 yd. expansion of Wayne Major Airport near Detroit, Mich.	Sand, clay, and topsoil.	Thin cuts, shallow fills, good weather.
5940'	5	Not measured	John F. Wolner, Contractor Pontiac, Mich.	2 C Tournapulls grade, gravel 2 mi. of access roads in Camp Grayling, Mich.	Gravel, sandy loam.	Loose, abrasive material.
7920'	4	48	A. L. Dyer & Sons McBride, Mich.	3 C Tournapulls on 1 mi., 210,000 yd. Hwy. 57 job west of Caruso City, Mich.	Topsoil, clay and fine dune sand.	Part of haul over existing highway through heavy traffic.

Note { C TOURNAPULL—13.5 yds., speeds to 35 m.p.h.
D ROADSTER—7 yds., speeds to 28 m.p.h.

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all types of scraper materials, under all job conditions, big jobs, little jobs, anywhere dirt is moved . . . Tournapull speed, versa-
tility, and low cost of operation add up to lowest net-cost-per-yard.
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WEIGHT: 18,500 lb.
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GM 4-71 DIESEL ENGINE
SPEEDS: 6 forward, to 5.68 mph.;
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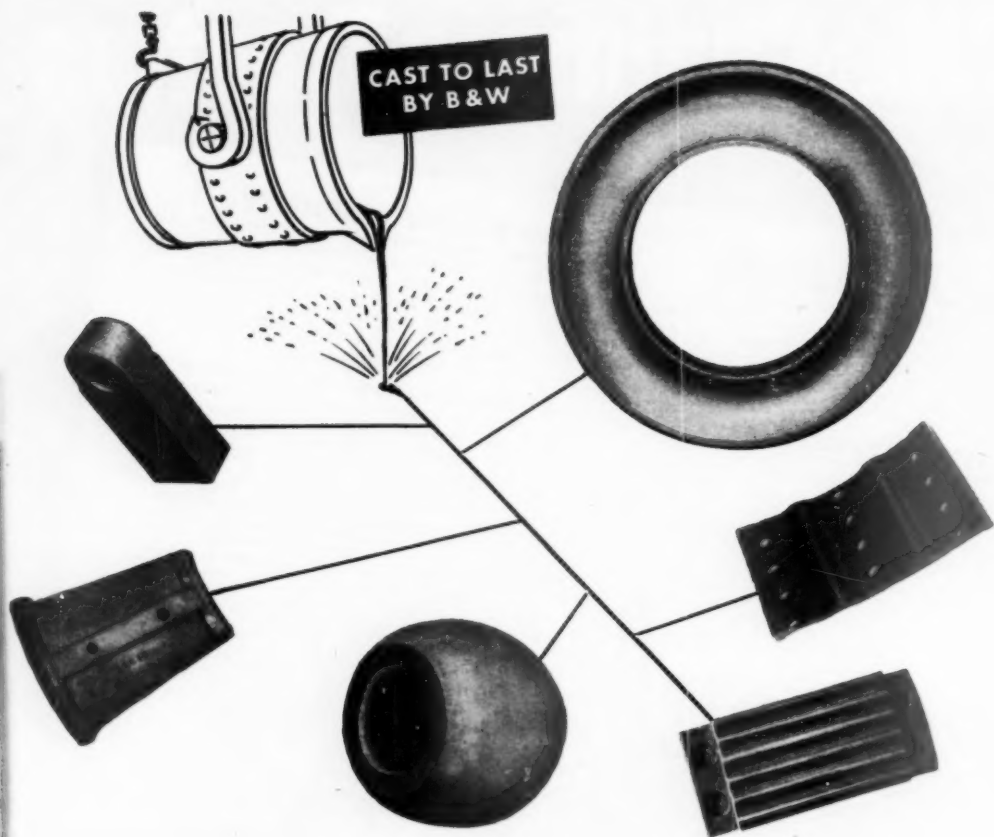
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for Both The HD-9
and HD-15.

HD-15

WEIGHT: 27,500 lb.
102 DRAWBAR Hp.
GM 6-71 DIESEL ENGINE
SPEEDS: 6 forward, to 5.80 mph;
3 reverse, to 4.51





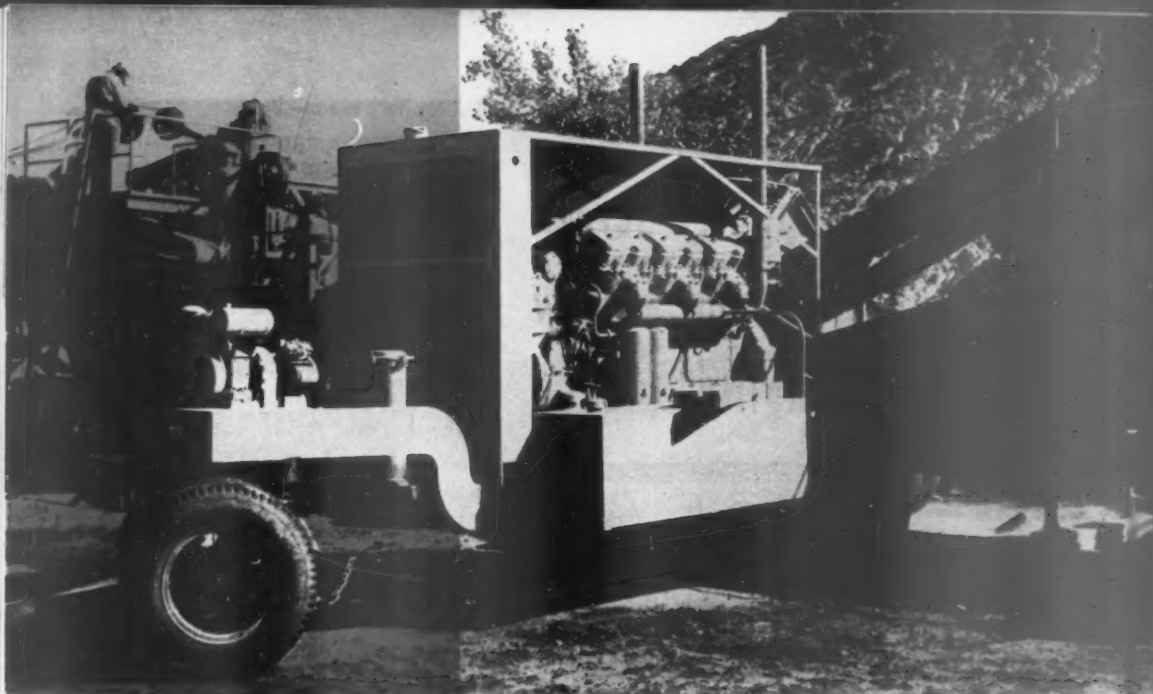
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Connecting rods for "Caterpillar" Diesels are made of medium carbon steel, drop forged and heat treated. Of "H" section design, they are rifle drilled to provide oil passage to the piston pin, and to oil-cool the piston. Connecting rods are balanced to close limits. Crank-pin bearings are solid aluminum alloy, precision type. Piston-pin bushings are bronze and are precision bored. Look under the hide for built-in quality.

HERE's part of a portable crushing plant operated by Schildberg Construction Co., Greenfield, Iowa. That engine is a D386 "Caterpillar" Diesel, conservatively rated at 400 HP. It powers the primary crusher and hammer mill, while a D4600 drives the screens and conveyor and a D8800 drives the jaw crusher. The plant averages 1,200 tons of crushed rock per day for county secondary roads, as well as limestone dust for agricultural purposes. D. H. Schildberg says: "We have other 'Cat' units on our other job. Since we've seen their trouble-free operation, we specify 'Cat' Diesel power on all of our replacement engines. We get good, dependable service from our dealer."

Standardizing on "Caterpillar" power units is a good move whether you've got a stationary or portable plant. They're ruggedly built to deliver reliable performance at a minimum cost for fuel, repair and maintenance. And field records on the dustiest, toughest jobs *prove* it. What's more, your "Caterpillar" dealer is on duty to provide on-the-job service 24 hours a day!

"Cat" Diesel Engines are built in ten sizes up to 500 HP. The power they promise is the power they deliver. The importance of these engines for both military needs and maintaining the civilian economy is increased by the present situation. Talk over your engine requirements with your "Caterpillar" dealer. He has the complete stock of parts to keep your present equipment in running order and will do his utmost to make prompt delivery of new machines.

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Simplicity screen in operation at new Ohio "Aglite" plant



● "Aglite", a new lightweight concrete aggregate, is now being made on a production basis at a new \$250,000 plant erected by the Marietta Concrete Corporation at Marietta, Ohio . . . and a Simplicity Gyrating Screen with special tubular scalping deck is an important unit in this new commercial operation. "Aglite" is produced by sintering a mixture of finely crushed clay or shale and coal, and as the cake comes from the 54'-long sintering machine, it passes through a crusher and then over the Simplicity Screen where return fines and minus $\frac{5}{8}$ " material used as bedding in the sintering operation are removed.

● "Aglite" has many features to make it an interesting factor in the lightweight aggregate field, and Simplicity Gyrating Screens have all the features to do a top-notch job in every screening, sizing, or dewatering operation. Get all the facts and you'll get a Simplicity. A Simplicity sales engineer will be glad to study your problem and make equipment recommendations to do your job faster and more economically. Write us today.

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ONE MAN can perform all routine maintenance jobs on this brand new line of Allis-Chalmers large motors. He can remove the upper halves of the end brackets and air baffles and reach right inside the motor with his vacuum cleaner or air hose. There is plenty of room to reach up back of the stator core through air discharge openings in the stator yoke.

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The capsule-type sleeve bearings need not be opened up and exposed when the end bracket halves are removed. The bearings are protected from abrasive dust and dirt while the motor is being cleaned. This eliminates the work usu-

ally required to dismantle the bearing, clean and reassemble it during routine maintenance.

Easy Installation

Large stator air discharge openings with removable louvers allow ample room to use an electric or air drill for doweling and bolting the motor to the foundation. These large discharge openings plus adequate air intake openings in the end bells provide cooling air at low velocities.

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You'll be proud of the appearance of

the new Allis-Chalmers motor in your plant, too. Clean, simple lines and smooth contours give outward confirmation of its inner strength.

These new design Allis-Chalmers drip-proof and splash-proof bracket bearing squirrel-cage induction motors are built in sizes from 60 hp at 300 rpm to 1500 hp at 1800 rpm. Ask your Allis-Chalmers representative to show you the details of this exceptional new motor or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 05B7542.

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By Processes and Reagents
Offered by Cyanamid

If you mine or contemplate mining any of the above non-metallic or metallic oxide minerals, these simple facts are important to you:

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2. Grade as well as tonnage will be important for defense-order needs.
3. Quickly, at low capital-cost, many properties can increase output; cut costs by less-selective mining; work deposits now considered to be sub-marginal; and ship higher-grade end-products by adding Processes and Reagents offered by Cyanamid.
4. A very considerable background of test results, design data and operating experience now exists on a long list of non-metallics to assure predictable performance in minimum time at lowest cost.
5. It is not one day too early to find out what Cyanamid can do to help you operate more efficiently into the future.

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WHAT CYANAMID OFFERS YOU

Cyanamid offers the two most efficient Separation Processes by Gravity Difference (Heavy-Media Separation and the Dutch State Mines Cyclone Separator) as well as a group of effective Specialized Reagents and Processes for Non-Metallic Froth Flotation. Alone or in combination, these Processes and Reagents are beneficiating thousands of tons per day in plants as small as 8 tons per hour and as large as 20,000 tons per day.

WHAT HEAVY-MEDIA SEPARATION DOES

Heavy-Media Separation accurately separates valuable mineral from unwanted deleterious material in sizes down to 30 mesh by virtue of their differences in specific gravity. You set the gravity of the Heavy-Media "pool" at any gravity from 1.25 to 3.40 to get the separation you want. From then on, the Heavy-Media unit maintains that gravity within ± 0.01 ; automatically recovers and reconditions the medium, and feeds it back to the separating pool. On many minerals, you can mine non-selectively

Cyanamid also offers, after preliminary discussion of your problem without cost or obligation, to run tests on your material in the Cyanamid Mineral Dressing Laboratory; to develop economic beneficiation flow schemes; to suggest proper reagent combinations; to cooperate with engineers of your choice in the design and construction of plants and to assist in tuning up the installation for most effective results.

by the most economical method with assurance that the Heavy-Media unit will produce a uniform end-product, regardless of how feed fluctuates in quantity or content of unwanted material. As Technical and Sales Representatives for Heavy-Media Separation Processes, we do not design, build or lease plants but can put you in touch with experienced engineering construction firms who do including those who can make speedy delivery of pre-fabricated "packaged plants" in capacities up to 300 tons per hour.

THE DUTCH STATE MINES CYCLONE SEPARATOR

This unique separation process is particularly applicable to the low cost separation of $\frac{1}{4}$ " \pm 65 mesh and finer sizes. Employing a unique application of centrifugal and centripetal forces, the Dutch State Mines Cyclone Separator merits study (a) as a low-cost method of pre-concentrating where the feed

contains only a small percentage of high-value minerals, (b) to produce a directly-marketable mineral concentrate from fine material, (c) to treat feeds which are inherently not amenable to jig or table treatment, or cannot be economically concentrated by froth flotation.

CYANAMID FROTH FLOTATION REAGENTS AND PROCESSES

Froth flotation is by far the most widely-used process for the beneficiation of fine material and as the final step in the treatment of feed that has been pre-concentrated by mechanical methods. In many instances, it has no peer and its use is constantly being expanded by the development of improved processes and reagents.

With the world's longest and broadest experience in the development and application of flotation reagents, Cyanamid offers the 800 Series, 700 Series, Oleic and other Fatty Acid Promoters, and Higher Alcohol Frothers, as well as Processes for their effective use. We welcome correspondence on these reagents and will gladly give you the benefit of our extensive experience in non-metallic flotation.

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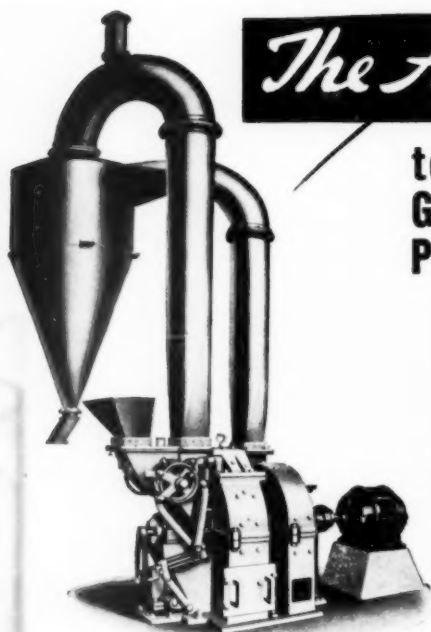
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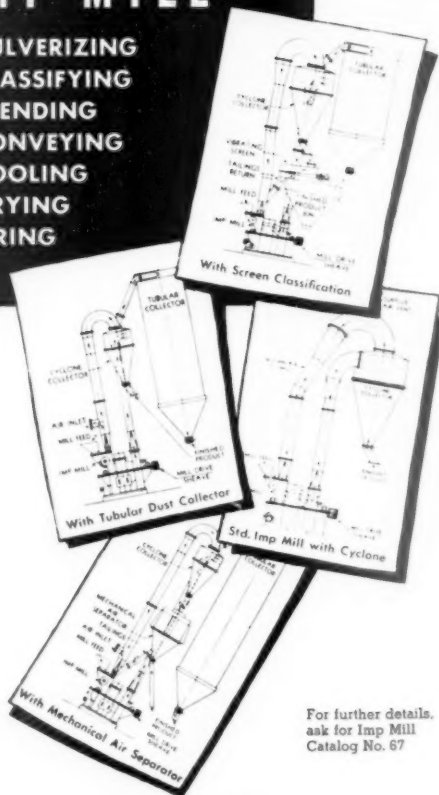
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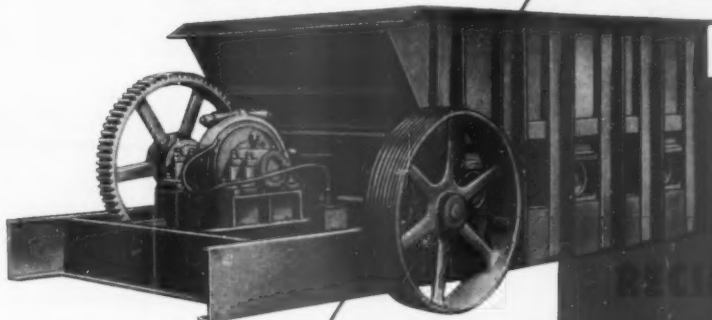
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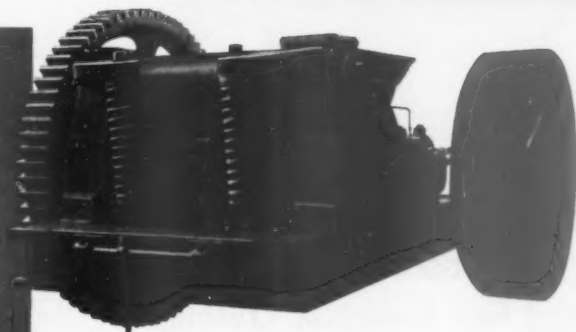
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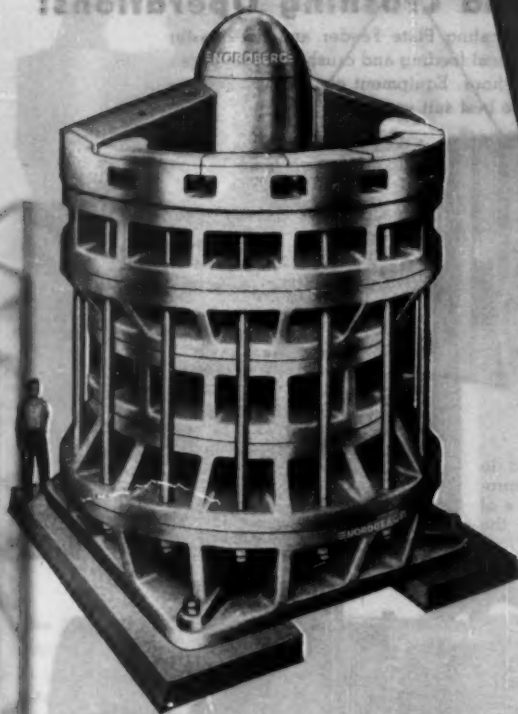
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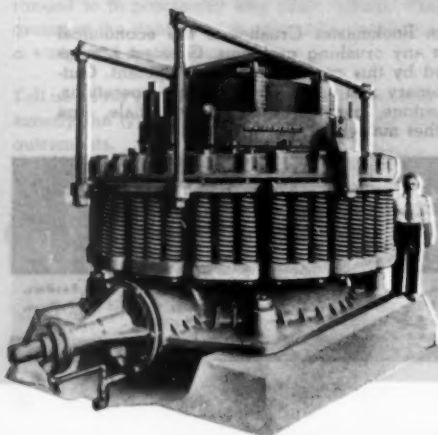
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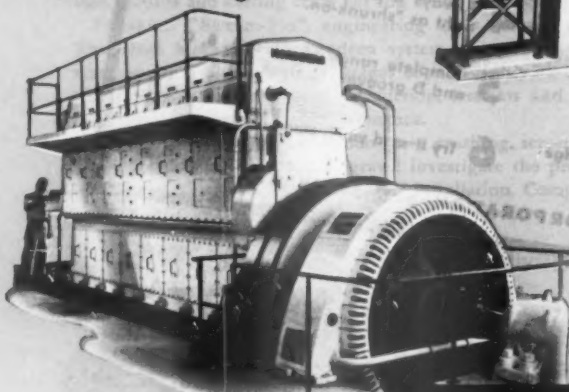
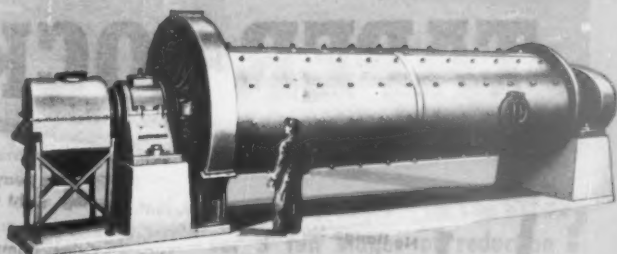
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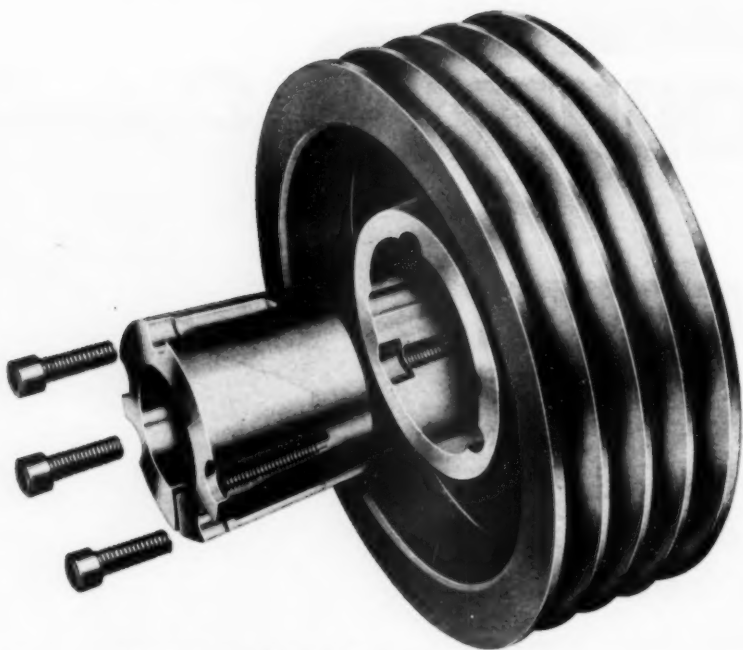
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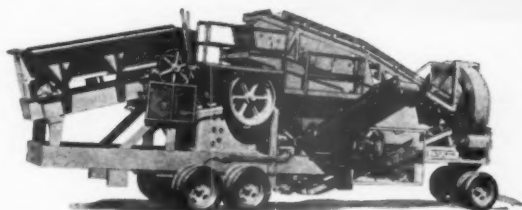
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of Mishawaka, Ind.

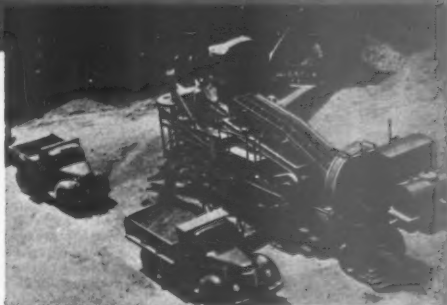
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4

TOP PRODUCERS THAT INVITE COMPARISON



1 TwinDual Pacemaker Rock Plant



2 TwinDual Gravel King—three stages of crushing, two screens for pits with large boulders

3 TwinDual Master Gravel Plant—double the output of conventional two-stage plants of comparable size and weight

4 TwinDual Secondary with 546P Primary. High capacity with two portable units for quarry operation



UNIVERSAL'S TWINDUAL PLANTS FOR ROCK AND GRAVEL

Out in front! Universal TwinDual Plants are breaking production records and cutting costs per ton on finished aggregate.

Universal "Stream-Flo" engineering does it with the TwinDual Method—the modern system of crushing and screening that gives three full stages of reduction with only two crushers. You get more production, less jaw and roll shell wear, longer life, less maintenance.

Before you make an investment in a crushing, screening and loading plant for rock or gravel investigate the profitable bonus you get with a TwinDual installation. Compare TwinDual Plants with the field. Get the facts now.

**How many crushers do you need?
for 3 full stages of reduction?**

**The TwinDual Method does it with two—
First Stage—Jaw Crusher
Second and Third Stages—TwinDual Rolls**

UNIVERSAL ENGINEERING CORP., division of PETTIBONE MULLIKEN CORP.

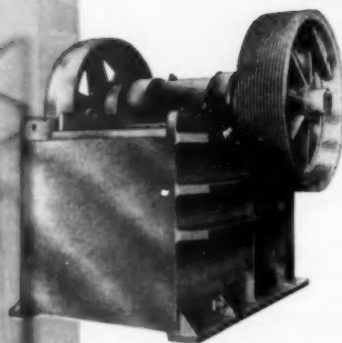
617 C Ave., N. W., Cedar Rapids, Iowa
Phone 7105

4700 W. Division St., Chicago 51, Illinois
Phone SP aulding 2-9300



for GREATER PRODUCTION CAPACITY INCREASED PLANT EFFICIENCY LOWER OPERATING COSTS **INSTALL**

for crushing

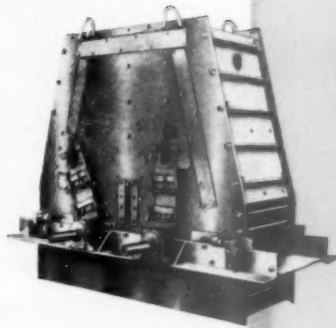


JAW CRUSHERS

HERE'S the high capacity primary crusher that sets the production pace for your entire plant! Cedarapids quality-built Jaw Crushers are the overhead eccentric type with one stationary jaw and one movable jaw and are engineered for *extra capacity* with smooth, steady performance plus low operating and maintenance costs. There's a size for every need from 6' x 12' to 32' x 40'.

DOUBLE IMPELLER IMPACT BREAKERS

THIS is the unit that assures greater hourly tonnage capacities of the cubical shaped aggregate required in so many specifications today. Used for both primary and secondary reduction in many applications, its extremely high ratio of reduction eliminates much accessory equipment such as secondary crushers, screens, conveyors, etc. Less horsepower required because a high percent of material is broken in suspension. 50% less contact of stone on metal reduces wear on working parts. Four sizes available.



**Use Cedarapids Crushers in your plant
to be sure of meeting production schedules**

TWIN JAW CRUSHERS

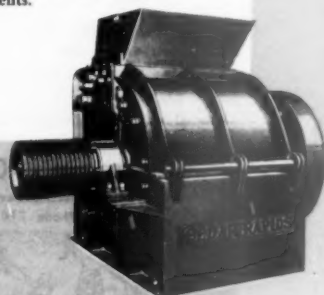
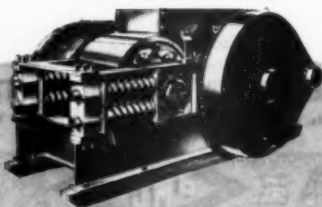
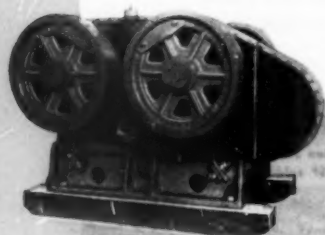
YOU get approximately twice as much capacity with a Cedarapids Twin Jaw Crusher as with a single-jaw crusher of the same size. This increased capacity is ideal for maintaining high production in pits with 50% or 60% of oversize material to be crushed. Rubbing between jaw plates is eliminated because both jaws move in-and-down as well as out-and-away in synchronized motion. A complete range of sizes.

ROLL CRUSHERS

For secondary crushing, Cedarapids Roll Crushers assure high production of the required smaller size aggregates. Manganese steel roll shells, either smooth or corrugated, and large, heavy flywheels, plus other heavy-duty construction features provide maximum long life and economical operation. Cedarapids exclusive patented safety shear plates prevent crusher damage from foreign material. Sizes range from 16" x 16" to 40" x 24".

HAMMERMILLS

Cedarapids Hammermills feature a revolutionary principle of crushing to give more tons per hour of finer quality finished products than similar types of equipment of comparable size. They produce either crushed limestone up to 1 1/2", or agricultural lime, or a percentage of both, depending on the setting of the grates and speed of the rotor. Three sizes . . . 2033, 3033, and 4033, will meet all your requirements.



THE IOWA LINE of Material Handling Equipment Includes:

ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS • FREDDERS • TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE AND GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS • HAMMERMILLS • DRAG SCRAPER TANKS • WASHING PLANTS • SOIL COMPACTION UNITS • STEEL TRUCKS AND TRAILERS • KUBIT IMPACT BREAKERS • DOUBLE IMPELLER IMPACT BREAKERS

CEDARAPIDS

AGGREGATE PRODUCING UNITS *Now!*

for material handling

CONVEYORS

Cedarapids portable belt conveyors with their own power unit are the flexible and economical answer to aggregate handling problems. Either the channel frame or lattice frame type can be supplied in 30', 40' or 50' lengths and 18" or 24" widths.



FEEDERS

Apron type or reciprocating feeders provide a smooth, workable flow of material to crushers, conveyors and bucket elevators, preventing overloads and surges. Available in a wide variety of sizes for all types of aggregate or asphalt plants.



BINS

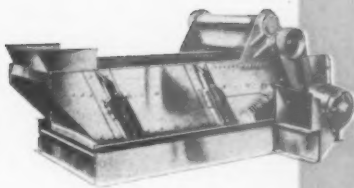
All-steel storage and loading bins give sturdy, dependable storage facilities for all types of prepared material. Jack leg and knockdown types are available with or without partitions. Special sizes and types can be built to order.



for screening

HORIZONTAL VIBRATING SCREENS

Here is the most efficient screen available today! Its better screening action, highly accurate gradation and large capacity combine to give you faster and more profitable screening at lower cost. Sizes range from 36" x 8' to 48" x 14' in single, double or triple deck styles. In addition, the Cedarapids line contains screens for special uses in a wide variety of sizes, including ag-lime screens, inclined vibrator screens and revolving screens.



for complete plants

From the Single Pass Plant or Pitmaster for the smaller jobs...to the Junior or Master Tandem...or the complete 4-unit Unitized Plant for the largest operations, there's a Cedarapids complete portable aggregate plant in a size and type to fit your pocket-book as well as your production needs.

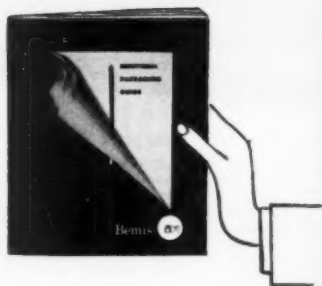
Your Cedarapids distributor will gladly give you production facts and figures on all Cedarapids equipment, including the complete line of portable bituminous mixing plants. Call on him today.

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

Cedarapids

Built by
IOWA



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INCORPORATED

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Quarry and mine owners all over the world know from experience that a Bucyrus-Erie excavator is their best assurance of dependable high output combined with on-the-job reliability through years of service. The 5 cu. yd. 120-B is a typical example of Bucyrus-Erie years ahead design, from its hard-digging dipper with tough manganese steel lip to its ground-gripping treads, heat-treated to withstand wear. Its

smooth Ward Leonard control and careful balance of speeds and power give the operator complete mastery of every function for a speedy, output-boosting cycle.

With capacities from $\frac{3}{4}$ to 36 cu. yds., there is a Bucyrus-Erie to fit any quarry or mine requirement, and to meet production demands with fast, smooth, economical operation.

108150

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ERIE**

SOUTH MILWAUKEE, WISCONSIN

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TIRES

TIRES used in rock work, strip mining, and earth moving have to face a terrific amount of torture. Whether they make or lose money depends on how *well* and how *long* they can take that torture.

Firestone tires can **TAKE** it. Time and again they break old performance records, set new records for long service. Such performance is no accident. The extra tough, job-designed treads and the all-rayon Gum-Dipped cord bodies—protected by four extra impact plies and extra-thick sidewalls—explain why Firestone tires turn in *better* work and turn out *more* work.

Not far from your project there's a Firestone Dealer or Store organization prepared to handle your complete tire needs and lower your operating cost. They will welcome the opportunity to call on you and show how this can be done.



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SPECIFY FIRESTONE OFF-THE-HIGHWAY TIRES

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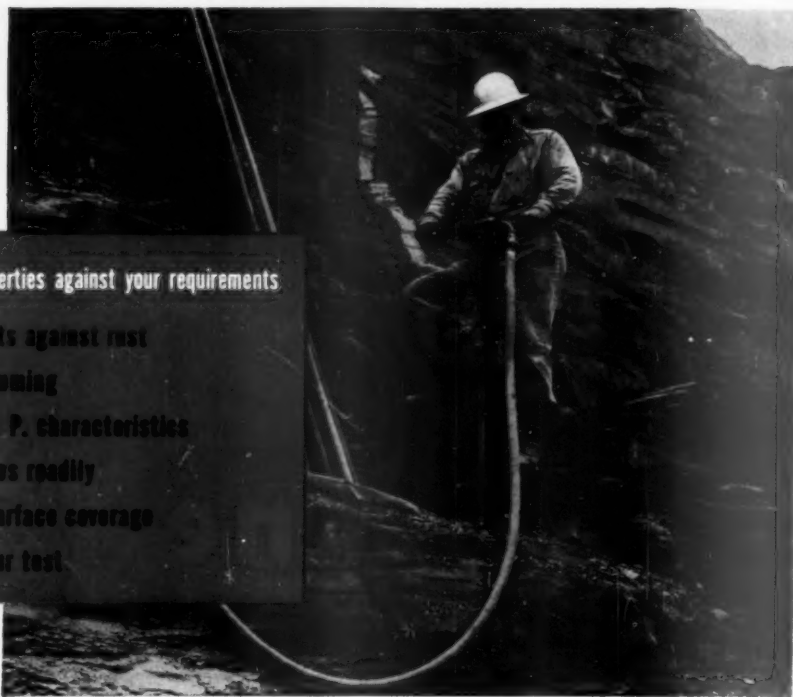
Copyright, 1950, The Firestone Tire & Rubber Co.

ROCK PRODUCTS, January, 1951

Avoid gum and rust in your air-operated tools with **Gulf Rock Drill Oil**

Check these properties against your requirements

- Protects against rust
- Nongumming
- Good E. P. characteristics
- Atomizes readily
- Good surface coverage
- Low pour test.



Gulf Rock Drill Oil keeps air tools clean as a whistle—free of gum and rust. Here's why! Gulf Rock Drill Oil contains an effective corrosion inhibitor that keeps moisture from contacting the metallic surfaces—there's no rust to foul up movement of internal parts.

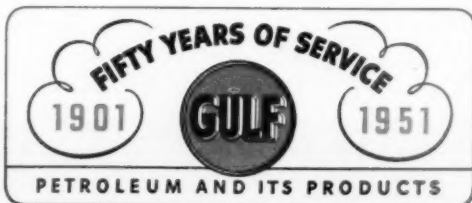
And because it has exceptional resistance to oxidation, Gulf Rock Drill Oil does not form gummy deposits. Thus air tools retain their efficiency longer, and the need for dismantling, cleaning, and repairs is reduced.

Then too, Gulf Rock Drill Oil provides outstanding protection against wear. It has good surface wetting ability—covers completely—and has high film strength.

Gulf Rock Drill Oil has the proper viscosity for this service—atomizes properly in air line oilers—and has a very low pour point. Its use insures

cleaner tools, fewer repairs, and lower costs for maintenance.

For further information on Gulf Rock Drill Oil and for expert help on the lubrication and maintenance of other types of quarry equipment, call in a Gulf Lubrication Engineer today. Gulf Oil Corporation • Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.



Here's FASTER, LOWER-COST BLAST HOLE DRILLING!

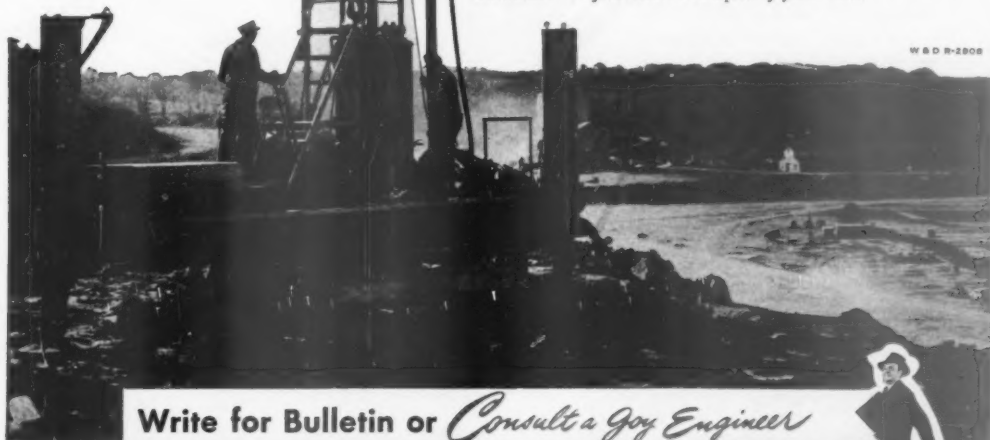
The New

JOY CHAMPION ROTARY DRILL

TWO MODELS

Illustrated, the JOY CHAMPION Heavyweight Drill. Mounted on sturdy crawler treads . . . sets up quickly, with centrally controlled hydraulic leveling. Also built in a Middleweight model—both sizes with either diesel, gasoline or electric drive.

DRILLS DRY—not only saves water costs and eliminates winter-freezing, but most important, gives you far more footage daily (actually 5 or 6 times more) than with conventional drilling methods, and at far lower cost per foot. The JOY CHAMPION continuously pressure-cuts the rock with a rotating tri-cone roller bit—shows exceptionally long bit life, even in dense dolomitic limestone. Rugged and self-propelled, it drills a 5½" to 7¾" hole perfectly straight and smooth-walled, insuring easier and safer powder loading and better fragmentation. • Want performance estimates? . . . just send us samples of your rock!

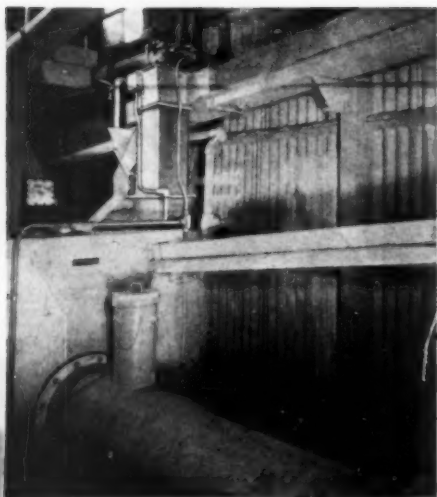


Write for Bulletin or *Consult a Joy Engineer*

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

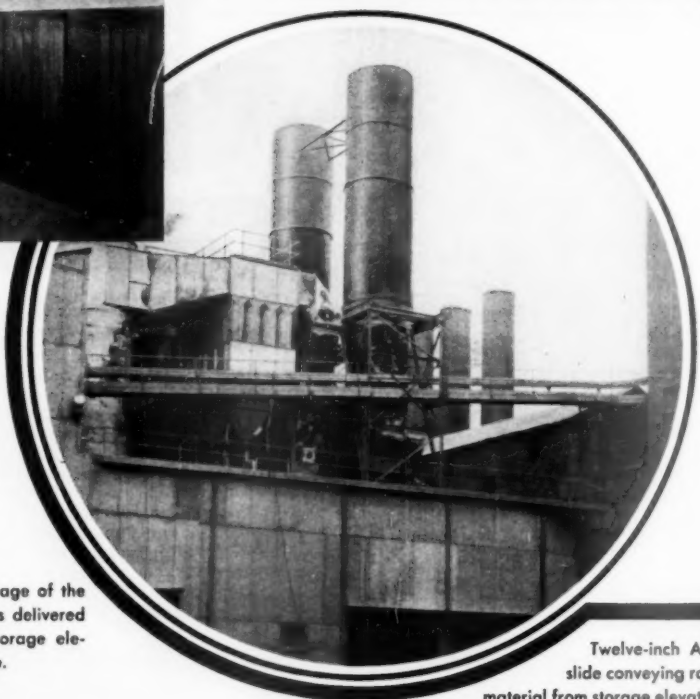
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



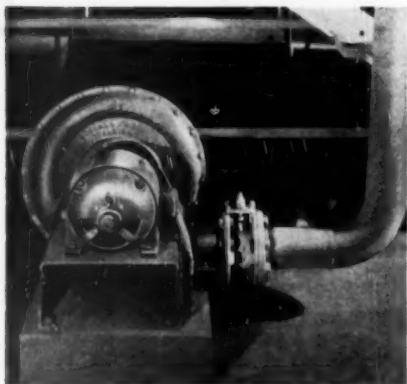
Continuation of 12-inch Airslide (upper) from raw-material storage elevator, showing motor-operated, F-H Side-Discharge Valve for delivery of material to constant-head feeder box and feeder screw. The 8-inch (lower) Airslide conveys material from kiln-feed elevator to the same feeder box. Overflow returns to kiln-feed storage bins. In the event of a stoppage of the kiln-feed elevator, material is delivered direct from raw-material storage elevator by the 12-inch Airslide.

applications unlimited

F-H Airslide®

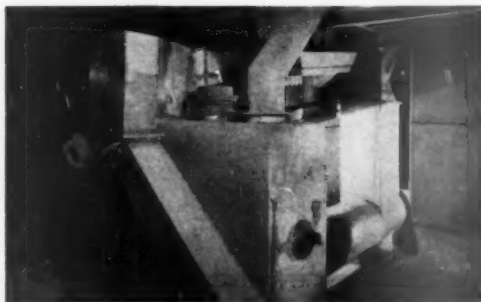


Twelve-inch Airslide conveying raw material from storage elevator to kiln-feed floor. Capacity of Airslide, 3000 cu. ft. an hour.



Fan Type blower which serves the kiln-feed Airslides.

7285 FH-18T



One of the two constant-head, kiln-feeder boxes and feeder screw, showing 12-in. (upper) Airslide, storage to kiln feed; and 8-in. (lower) Airslide, elevator to kiln feed. A Fuller Material-Level Indicator is shown on top of feeder box.

... efficiency ceiling high

There's virtually no practical application to which cement mill operators haven't put the F-H Airslide Conveyor. They use it to convey raw materials from pulverizers to storage; from storage to kiln-feed bins; finished cement from pulverizers to mechanical air separators; separator tailings and finished cement from separators; flat-bottom storage bins for delivery to packer bins. They use it to handle dust from collectors, hot precipitator dust and clinker dust. And that's only part of the list.

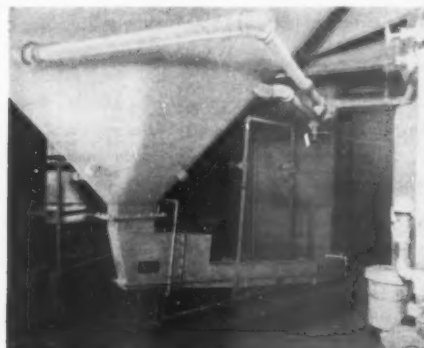
There are sound reasons for this widespread and enthusiastic acceptance of the Airslide by economy minded operators. They've found that the Airslide features extremely low power consumption and that maintenance costs are negligible. It's dustless in operation, requires less space and no lubrication, keeps occupational hazards at the minimum. Expensive drives, such as chains, belts and speed reducers are eliminated. Interruptions in production are reduced and there are fewer spare parts that need to be carried in stock.

Some of the many possibilities of the Airslide are illustrated in these views of an installation in a large eastern plant. There, the Airslide is used to convey raw materials from storage to kiln-feed bins. A study of the pictures and the isometric drawing will show how you can adapt the Airslide to your own operations. Fuller engineers will be glad to survey your present conveyor layouts and make suggestions that may well lead to more efficient, more economical conveying. Naturally, there's no obligation on your part.

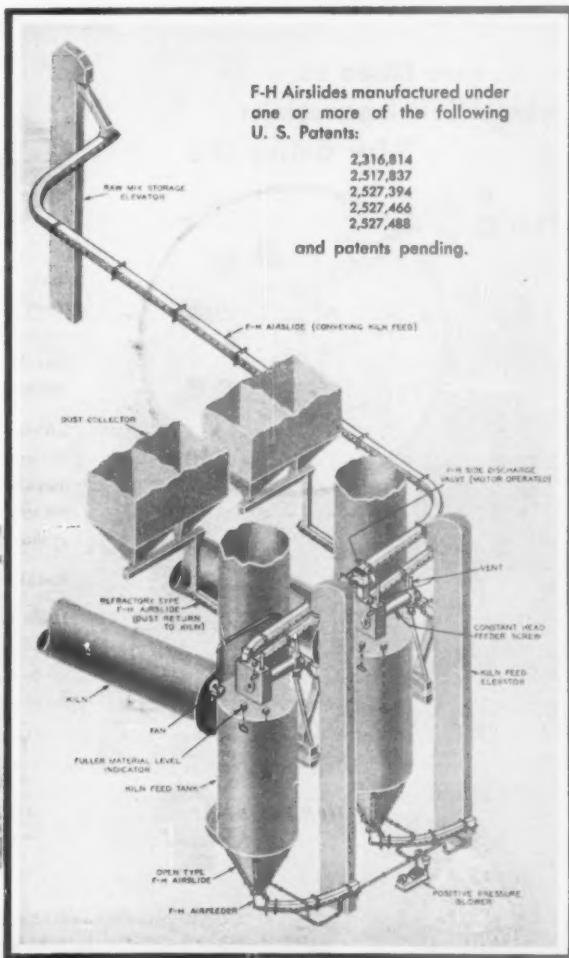
FULLER COMPANY
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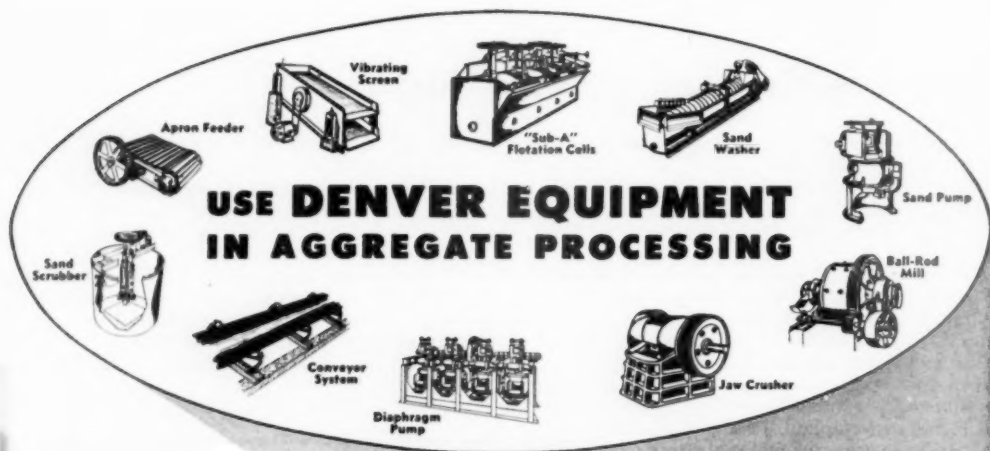
DRY MATERIAL CONVEYING SYSTEMS
AND COOLERS • COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT



One of two 8-inch Airslides and 6-inch F-H Airfeeders reclaiming raw material from kiln-feed storage bins and conveying to elevator for delivery to kiln-feed Airslides. Air piping entering side of cone serves four 6-inch Airslides installed in cone to assist in conveying.

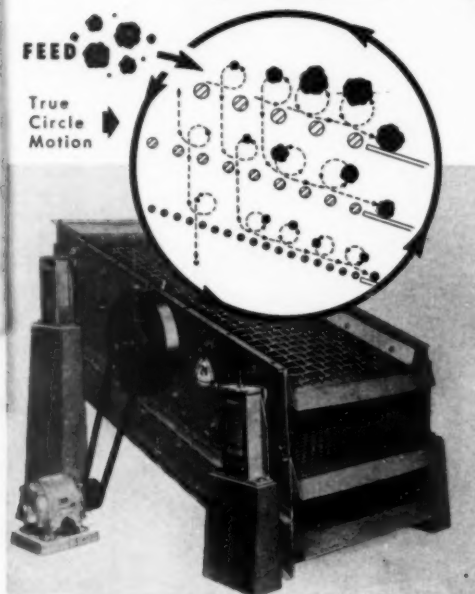


F-H Airslide System Layout



USE DENVER EQUIPMENT IN AGGREGATE PROCESSING

less fines in
classified aggregate
by using the



DENVER · DILLON Vibrating Screens

Better Cleaning . . . Less Penalty . . . More Profit.
Material literally comes straight down hundreds of times over the complete area of the fully activated screen so that every particle of undersize passes through the screen. Result is a minimum of undersize in every sized product.

Circle Throw Eccentric More than Vibrates the Screen.
The true circle motion lifts each particle up, back and directly down onto the screen cloth. Material more than flows across the screen . . . hundreds of times it moves up, back and down so that every particle of undersize passes through.

Result . . . a cleaner product . . . less penalty . . . more profit.

With the Denver Dillon Screen you also get . . . Two Bearing Suspension . . . Fifty Percent Less Horsepower Consumption . . . Minimum Maintenance . . . No Blinding of Screen Cloth . . . and many other features.

Want more information on this super screen?

Write today for Bulletin S3-B5, giving us some idea of your screening problem. You will receive a prompt reply and a solution.



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More trips with full load whether roads are good or bad—that's the contribution of Eaton 2-Speed Axles to greater truck operating profits. Eaton 2-Speeds have double the conventional number of axle gear ratios. As a result, the tremendous power of today's engines is utilized to best advantage—speed for good roads . . . pulling capacity under full load for tough spots. Regardless of driving condi-

tions, faster trips are the rule—without sacrificing payload. This ability to haul more is the reason that Eaton Axles pay for themselves over and over.

Eaton's performance is made possible by its exclusive planetary gearing, positive lubrication and other features which your truck dealer will be glad to explain.



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a new and proven tool in metallic and non-metallic minerals and chemical processing

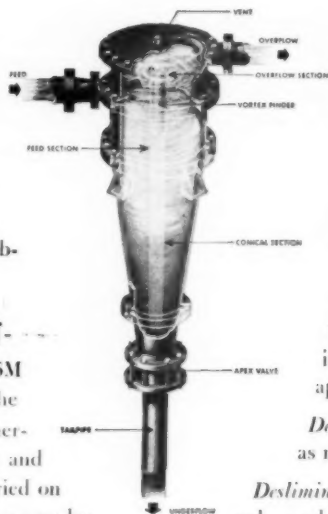
the DORRCLONE[®]

(DUTCH STATE MINES CYCLONE)

The DorrClone is a compact cylindro-conical classification unit utilizing centrifugal force in place of gravity. It provides a new method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current established practices.

RESEARCH AND DEVELOPMENT

Development of the DorrClone (DSM Cyclone) was begun in 1939 by the Dutch State Mines in The Netherlands, where a continuing research and development program has been carried on since that time. The Dorr Company, as exclusive licensee under the Dutch State Mines patent rights in all fields other than that of heavy media separation, has been actively engaged since 1948 in development work relating to design variables affecting performance, materials of construction and possible fields of commercial use. The result of this program is a carefully engineered unit, capable of controlled and predictable operation.



PRESENT AVAILABILITY

DorrClones are now available singly or in multiple arrangements in four standard sizes: 3", 6", 12" and 24" diameters.

APPLICATIONS

Standard units are now limited to separations in the 20 micron to 100 mesh range but present studies indicate broader applications in the future. Typical commercial applications proven to date are:

Degritting of viscous suspensions such as milk of lime and clay slurries.

Desliming of metallurgical pulps, phosphate rock, coal, iron ore and tailings for mine backfill, with the production of extremely dense underflows where such are desired.

Classification of crystalline and other granular suspensions.

PATENTS

The DorrClone is covered by patents issued and pending in the United States and other countries.

Further information... We welcome inquiries on specific problems and applications and are prepared to undertake engineering investigations within the scope of our present knowledge and experience.

[®]DorrClone is a Trademark of The Dorr Company

DORR

RESEARCH — ENGINEERING — EQUIPMENT

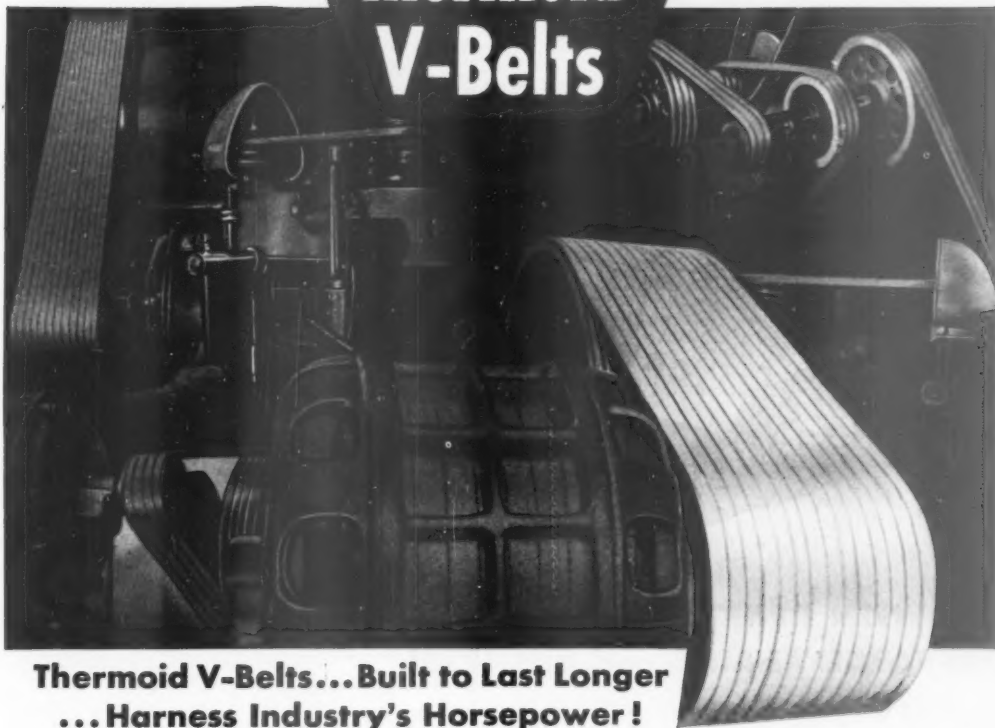
DORR

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Thermoid V-Belts... Built to Last Longer ... Harness Industry's Horsepower!

From the smallest fractional horsepower size to the largest multiple V-Belt... Thermoid top-quality serves the needs of every industry. Thermoid V-Belts mean longer-than-average wear, maximum power transmission without slippage and lowest over-all operating costs.

Thermoid V-Belts are specially impregnated to withstand excess moisture... abrasion... acidity... all those elements that hasten belt deterioration.

They are prestretched to insure perfect operation without adjustments.

For smooth, efficient performance... for ability to absorb repeated shock loads... for lowest cost per hour... specify Thermoid V-Belts. Call your nearest Thermoid Distributor today. He has a complete range of sizes available to meet your requirements. And for your special belt problems, Thermoid Field Representatives are always available to help you select the right belt for the job.

It will pay you to **Specify Thermoid**

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

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CAPACITY GOING UP...

COSTS COMING DOWN...

WITH REX ELEVATOR CHAINS and BUCKETS!

With Rex Elevator Chains, Sprockets and Buckets, you can increase elevator capacity . . . reduce operating and maintenance costs.

Because there is a Rex Chain, Sprocket or Bucket that exactly fits every type of elevator service, you can select the equipment that will best stand up under the service requirements . . . add capacity through the elimination of premature failures that hold up production.

Each Rex Elevator Chain, Sprocket and Bucket is designed specifically for the conditions under which it must operate. Chain attachments are designed for the chain with which they are to run—for equal load distribution and long life. Speeds, capacities, type of material handled, daily number of operating hours are basic considerations that determine the type of chain to be used.

For help in selecting the right chain, sprocket or bucket for your elevators, consult your local Rex District Office or write direct to Chain Belt Company, 1649 West Bruce Street, Milwaukee 4, Wis.



DRIVE AND CONVEYOR CHAINS

FIRST FOR LASTING SERVICE

now available from stock



REX LEY BUSHED CHAINS

For moderate loads and speeds, exceptionally severe abrasive service



REX DUROBAR COMBINATION CHAINS

For general, moderate load, slow speed service



REX CHABELCO CONVEYOR CHAINS

For heavy loads, high speeds, severe abrasive conditions



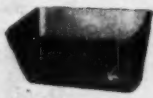
REX CHABELCO DRIVE CHAINS

For efficient, low-cost power transmission



REX STYLE "A" BUCKET

For General Service



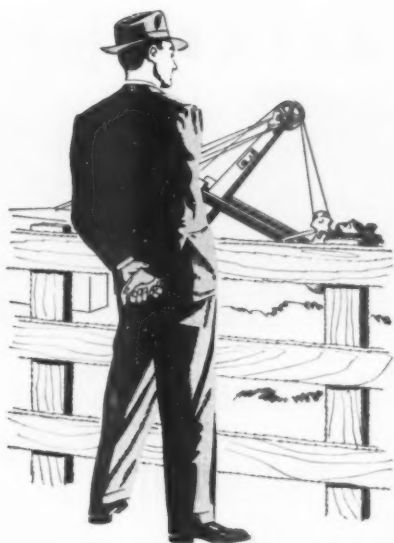
REX STYLE "AA" BUCKET

For heavier, more abrasive materials



REX TEMPERIM SPROCKETS

With hardened teeth and rims for long service under abrasive operating conditions.



who's this *Sidewalk Superintendent?*

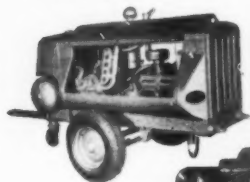
He's a Gardner-Denver field engineer away from the office—watching construction problems as they turn up. He knows first hand just what you expect construction equipment to do for you.

Gardner-Denver Portables, for example, are tops in dependability...

Because they are *all* water-cooled—all the way down the cylinder. You can bank on Gardner-Denver Two-Stage Portable Compressors for steady going regardless of temperature, weather or altitude.

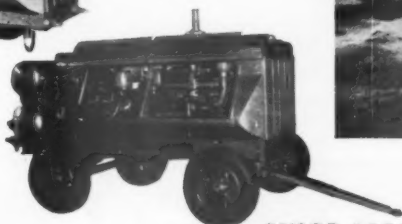
Choose any size Gardner-Denver Portable—from 105 to 500 cubic feet actual capacity—for the best protection against compressed air emergencies.

Bulletins PC-12 and PC-15 give all the facts on diesel and gasoline engine driven models. Write us today!



Model WH-105

Model WH-315



Model WH-500D



SINCE 1859

GARDNER-DENVER

The Quality Leader in Compressors, Pumps and Rock Drills

Gardner-Denver Company, Quincy, Illinois

In Canada:

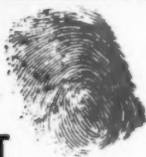
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

ALL ROPES look ALIKE... but

IN

Carbon Content is Determined on

Scales that can Weigh a FINGERPRINT



Scales so sensitive they can weigh your finger print—that's a typical example of the exacting control we maintain over steel that goes into Wickwire Rope.

Because of such precision analysis and testing, we're able to hold and maintain carbon content of steel within five points (.05%) of the appropriate value for each of our commercial grades of wire rope. That's mighty important—because correct carbon content of steel determines its strength, toughness, ductility, hardness and uniformity of grain size to McQuaid-Ehn* standards.

Basic control like this is possible only with a fully integrated company like Wickwire where manufacture of wire rope starts with the actual making and refining of the steel.

Thus, Wickwire goes "beyond specifications" to supply you with wire rope that has no equal for longer life, utmost safety and enduring reliability.

Look for the **YELLOW TRIANGLE** on the reel

*Write for detailed information on the McQuaid-Ehn test to Wire Rope Sales Office, Palmer, Mass.

WICKWIRE ROPE



A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass.

EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Casper • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Houston • New York
Odessa (Tex.) • Philadelphia • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

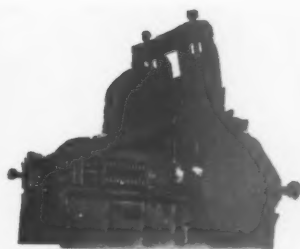
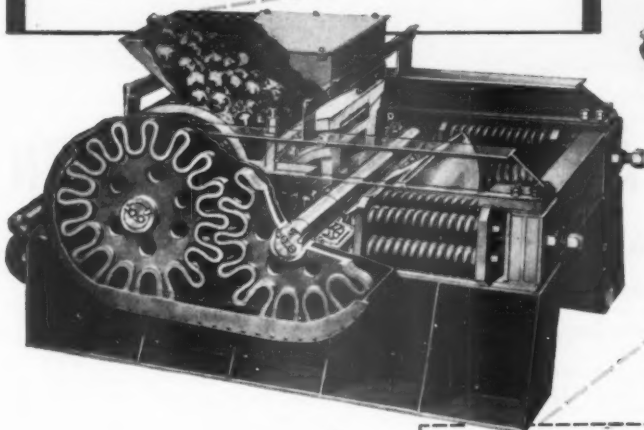
One ax handle wide... 65 miles a day...

THAT'S THE WIDTH ... and the speed ... of a 54" x 24" roll crusher. It can turn out a ribbon of pay material 24" wide ... 65 miles long every day.

Each rock is *grabbed* by the rolls and is force fed in a continuous crushing action. No eccentric ... no intermittent crushing ... no gravity feed ... and the material is cracked, not pulverized.

Of course Pioneer makes roll crushers. We're roll crusher specialists! We build twin rolls in four sizes ... we build them for stationary plants and we build them on wheels ... we are the only manufacturers of Triple Roll Crushers. As specialists, we originated "Star Gear" drive for roll crushers, we have cheek plates that make shells wear uniformly from end to end. And we know how to keep shells from banging together ... and cracking.

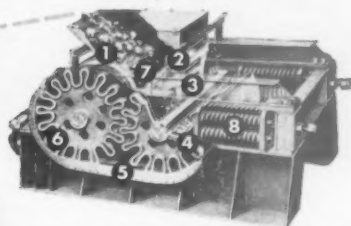
If you want more specification material at lower cost per ton, mail the coupon today.



TRIPLE ROLL CRUSHERS for increased stage of reduction, made in three sizes; 54" x 24", 40" x 22" and 30" x 18". Third roll attachment available for Pioneer Twin Roll Crushers.



COMPLETE SECONDARY UNITS for stationary plants. Pioneer builds Roll Crushers on skids, with motor or power unit and drives. Simplifies installation ... assures satisfactory operation from the start.



1. Hopper Spreads material over full width of roll.
2. Cast Manganese Steel Shells held in place by full circle wedges.
3. Shells Changed without removing bearing from shaft.
4. Timken Roller Bearings in self-aligning pillow blocks.
5. Oil Tight, dust tight gear housings.
6. Star Gear Drive eliminates chains.
7. Wedge Blocks provide easy adjustment.
8. Safety Spring Release protects crusher.

BUY BOTH!

Higher Output,
Lower Upkeep!

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● Please send information on the Roll Crushers checked:

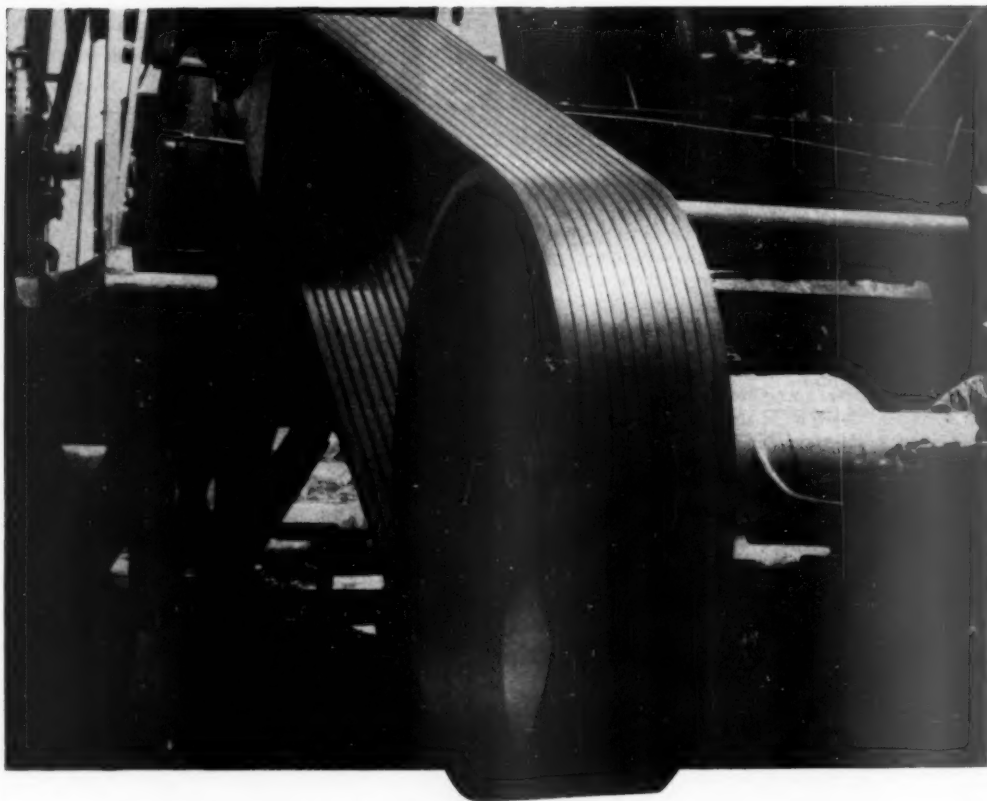
- | | |
|---|--|
| <input type="checkbox"/> 24 X 16 ROLL CRUSHER | <input type="checkbox"/> 54 X 24 ROLL CRUSHER |
| <input type="checkbox"/> 30 X 18 ROLL CRUSHER | <input type="checkbox"/> TRIPLE ROLL CRUSHER |
| <input type="checkbox"/> 40 X 22 ROLL CRUSHER | <input type="checkbox"/> ROLL CRUSHERS ON WHEELS |

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BULL DOG V-BELTS ARE THEIR OWN BEST SALESMEN

**... they resist cracking
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under severe flexing!**

If you are less than happy with your V-Belt performance and life — install a set of BULL DOG V-BELTS. THEY WILL SELL THEMSELVES TO YOU! They are processed for longer life of completely new compounds under the closest quality controls. Result: Users everywhere are benefiting by cooler running V-Belts which resist cracking and deterioration under severe flexing.

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Back of these better-built Bull Dog V-Belts is the BWH good name — a name renowned for quality mechanical rubber products for 72 years. There's a BWH distributor in your territory. Call him today.

TOUGH PROBLEMS INVITED — Don't hesitate to ask us or your nearest BWH distributor about your power

transmission belting, conveyor belting and hose problems. We are specialists in making mechanical rubber products work better, longer.

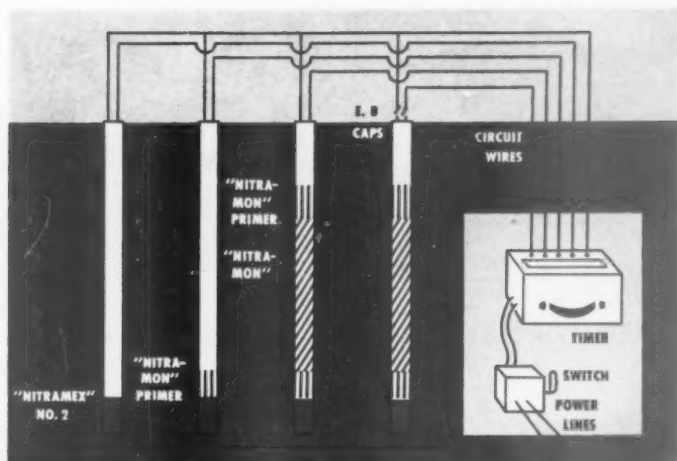


Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

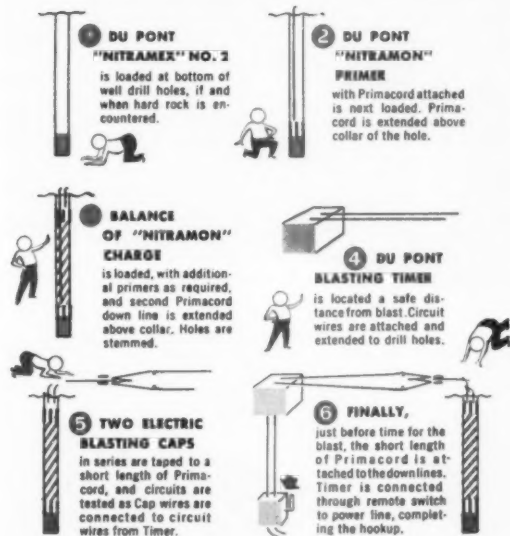
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*"You get better breakage,
less vibration with this safe quarry blasting plan"*

It's easy to follow...economical to use:



IT'S SAFER than conventional methods because the plan utilizes "Nitramon"* and "Nitramex"®... the safest blasting agents known. They can't be detonated by commercial blasting caps, fire, friction, falling objects, or even the impact of ball ammunition. But charges are readily detonated with a "Nitramon" Primer, itself relatively insensitive. Primers are initiated with Primacord. No caps are placed in the drill holes.

IT'S MORE ECONOMICAL because charges can be loaded far in advance of firing and also because the unusual "peeling" action at split-second intervals greatly reduces vibration, improves fragmentation and reduces back break. Wet conditions are no problem with "Nitramon" and "Nitramex" No. 2. There are no headaches because these blasting agents contain no nitroglycerin.

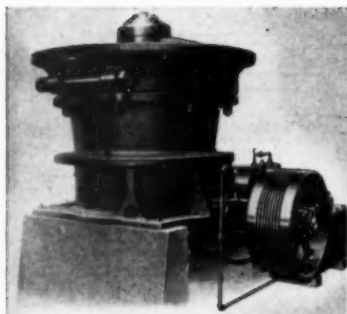
ASK THE DU PONT Explosives representative in your area for complete information about this safe, efficient and economical plan for quarry blasting, or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

*Reg. Trade-mark for nitrocarbonate blasting agent.
**Trade-mark for Du Pont ammonium nitrate blasting agent.

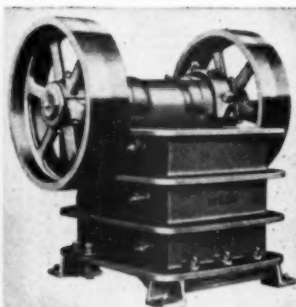
DU PONT EXPLOSIVES
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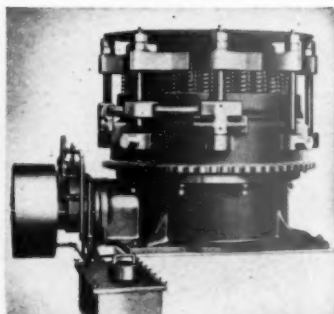
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY



GYRATORY BREAKERS



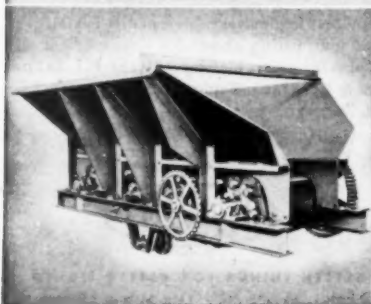
JAW CRUSHERS



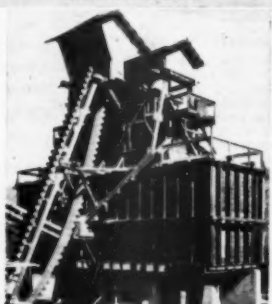
GYRASPHERE CRUSHERS



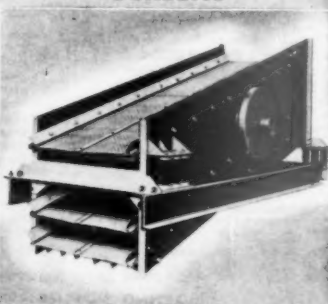
FEEDERS

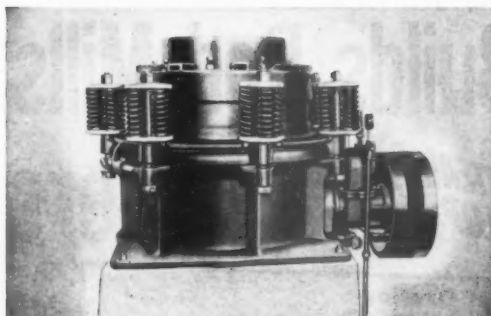


ELEVATORS

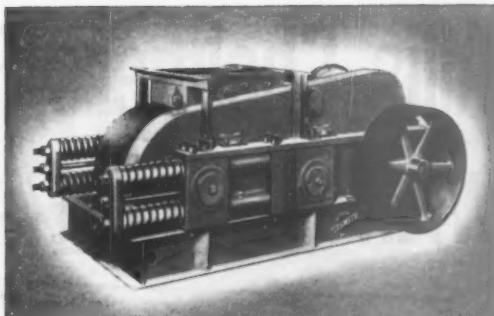


SCREENS





INTERCONE CRUSHERS



ROLL CRUSHERS

EQUIPMENT

Telsmith engineers design and build *all* types of crushers and an equally wide and varied line of equipment for feeding... screening... washing... classifying... sizing... conveying... loading... in a complete range of models and sizes.

Thus Telsmith engineers can recommend *without bias or prejudice the equipment best suited to your conditions or needs!*

Every piece of Telsmith equipment is designed and built to operate

with equally high efficiency... as a single unit, or as a part of the production line in a plant or process.

Ruggedly built... for heavy and continuous duty. Every modern feature of design... for greater capacity... extra flexibility... lowest upkeep. Telsmith equipment will give you finer sizing... improved products... and cut your costs!

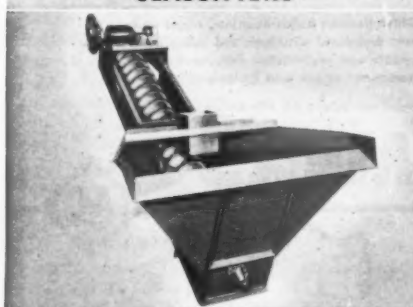
Consult Telsmith engineers; get Bulletin 266.

ES-1-R2

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

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CLASSIFIERS



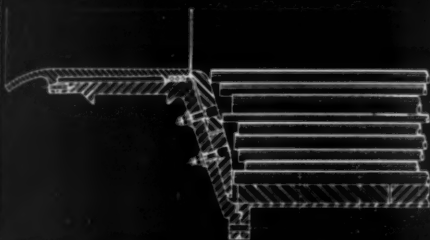
CONVEYORS



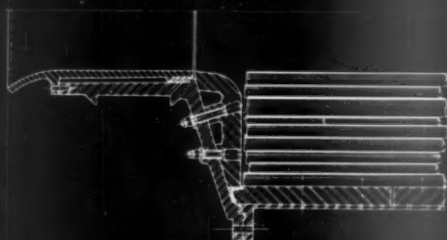
Allis-Chalmers Builds Rod Mills with Straight *INSTEAD OF SLOPING* End Liners

**HERE'S
WHY...**

- Less Rod Overlap
- Less Wasted Grinding Area
- Less Gouging of End Liners by Protruding Rod Ends
- Better Grinding Efficiency...
Less hp per ton
- Minimum Tramp Oversize in Product



Sloping end liners invite this condition. Rods overlap, causing wasted grinding area at rod ends and excessive wear on end liners.



Vertical end liners keep rods even in mill. Wear on end liner is greatly reduced. All of rod length is utilized for useful grinding.

STRAIGHT END LINERS mean better grinding performance all around . . . with less costly maintenance. That's why vertical end liners are standard on Allis-Chalmers rod mills.

It adds up to this—close control of product top size . . . and less hp required to grind more product. All available rod length is utilized. No wasted power caused by rod overlap. The actual gain in grinding efficiency with vertical end liners may be as high as 2 percent!

Allis-Chalmers is the *only manufacturer* building large rod mills with vertical end liners. Other reasons why it pays to specify Allis-Chalmers for grinding mills:

- ▶ There's no pocket between end liner and head at trunnion end to fill with pulp and form a race. This space is filled with cement before end liner is installed.

- ▶ Three packing rings seal space between trunnion liner and trunnion.

- ▶ Trunnion bearings on larger size mills are equipped with an individual high pressure lubricating pump to "float" the mill for starting. No destructive bearing wear caused by high starting torque.

There is an Allis-Chalmers engineer-consultant in your area who can point out other advantages of A-C grinding mills . . . and help you work out your grinding problems. Call him, or write Allis-Chalmers, Milwaukee 1, Wis.

Allis-Chalmers builds overflow, center and end peripheral discharge rod mills; ball, pebble and prelinator mills; multi-compartment Compeb and Ballpeb mills.

Compeb and Ballpeb are Allis-Chalmers trademarks.

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A-3241

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Principal Cities in
the U. S. A. Distributors
Throughout the World.



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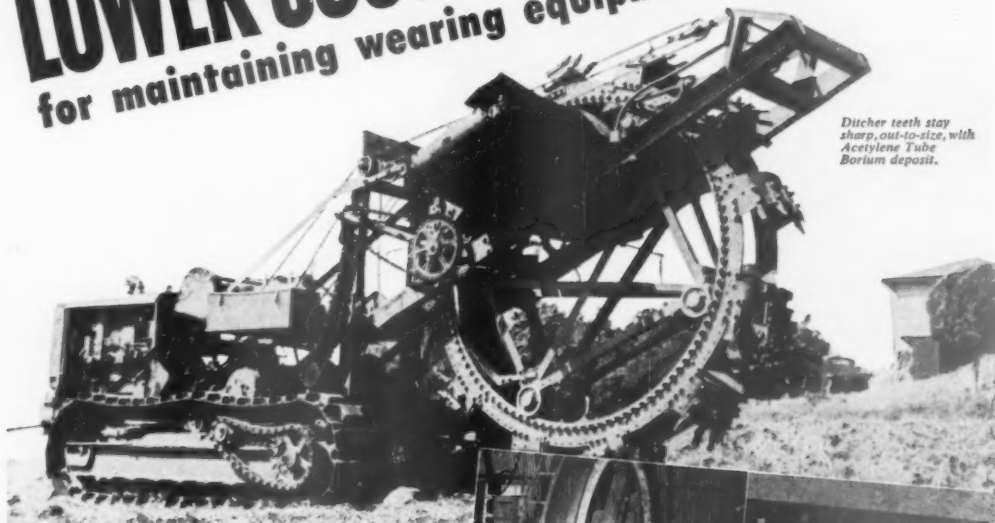


Kilns, Coolers, Dryers



LOWER COST METHOD

for maintaining wearing equipment!



Ditcher teeth stay sharp, out-to-size, with Acetylene Tube Borium deposit.

Automatic Hard Facing with STODY ALLOYS

**keeps parts in operation,
saves time, cuts costs.**

Don't junk worn parts! Tightening steel supplies and parts shortages now make it even more important to protect present equipment inventories. But here's good news: *More parts than ever, from all types of equipment, are being automatically hard-faced with Stody Alloys.* Parts are lasting longer, users are saving money, shortage worries are being eased!

Stody Alloys for Automatic Application double or triple part life. Application is faster and deposits are far smoother. No machining or finishing of deposits is usually necessary. Cost is naturally lowered because of increased speed. And, when hard-metal application is finally worn away, parts can be re-processed for a new lease on life!

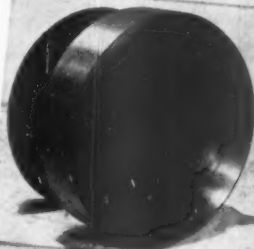
Many shops now located throughout the country are equipped to automatically hard-face your wearing parts with STODY ALLOYS. We will gladly furnish names of those nearest you. Write also for information on STODY AUTOMATIC WIRES for hard-facing or see your nearest Stody Dealer. He will gladly advise you.



Automatic hard-facing salvages both this 7'-6" tire and 8" trunnion.



A manual application of Stody Self-Hardening 21 protects corners of end plates.



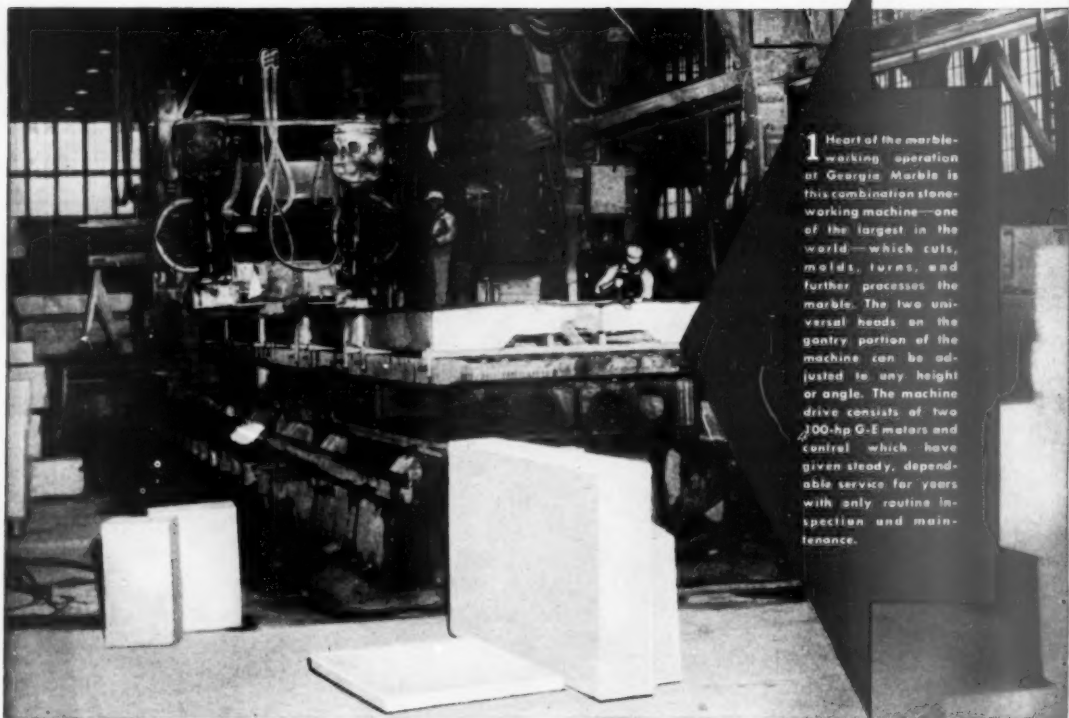
Clutch and brake drum faces on power take-off automatically hard-faced with Stody 107.



Note smoothness of Stody 105 deposit automatically applied to D-8 tractor rollers.

STODY COMPANY

11929 EAST SLAUSON AVENUE, WHITTIER, CALIFORNIA



1 Heart of the marble-working operation at Georgia Marble is this combination stone-working machine—one of the largest in the world—which cuts, molds, turns, and further processes the marble. The two universal heads on the gantry portion of the machine can be adjusted to any height or angle. The machine drive consists of two 100-hp G-E motors and control which have given steady, dependable service for years with only routine inspection and maintenance.



2 At the quarry, where blocks of marble are hoisted onto flat cars for shipment to the plant, this 50-hp, G-E Tri-Clad[®] motor, with its G-E control shown at left, powers the 20-ton quarry hoist. Tri-Clad motors are noted for their built-in 3-way extra protection against physical damage, electrical breakdown, and operating wear.

[®]Reg. Trade-mark of General Electric Co.



3 This 65-ton G-E diesel-electric switching locomotive, shown hauling marble blocks to the plant over the company's 14 miles of rail road, has been in service since April 1946. According to T. J. Durrett, Jr., vice-president, "it has provided excellent service, considerable saving in track maintenance, and substantial fuel economies."



4 After going through gang saws operated by a 40-hp G-E motor, the marble slabs are smoothed down on two rubbing-beds (one shown), both powered by the 60-hp G-E motor in upper left. The plant's G-E motors and control have helped maintain a high degree of production continuity.

You can put your confidence in—

GENERAL  ELECTRIC

058-4

ELECTRIFICATION WITH G-E DRIVES BOOSTS PLANT'S OUTPUT!



5. Providing stabilization of voltage at Georgia Marble Co. plant is this G-E 3000 KVA synchronous condenser which improves power factor throughout varying load conditions inherent in rock products industry. Another method for improving plant power factor is the use of efficient, trouble-free synchronous motor drives where applicable.

**Everything you need
to cut rock product costs
... electrically!**

G-E motors and control, plus G-E diesel-electric switching locomotive, increase efficiency and savings at Georgia Marble Company

In marble-working—as in all rock product industries—electrification pays off handsomely when you use General Electric equipment. Take it from T. J. Durrett, Jr., vice-president of the Georgia Marble Co., of Tate, Georgia, who says:

"Electrification in our plant over the years has considerably improved operations, helping to raise production and reduce costs. In this respect our G-E equipment, in particular, has more than justified its cost."

Here's the point: Whatever you get from General Electric, whether a drive for one process or all your plant's electric equipment, it's coordinated into a smooth-working installation by a G-E industry engineer. Call him in early and see how his advice can help you speed output, cut costs. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*



**GET
SPECIFICATION
SANDS
WITH**

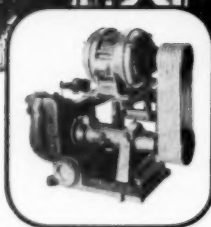
WEMCO

SAND PREPARATION MACHINES

No. 48 WEMCO Sand Preparation Machine.



No. 48 WEMCO Sand Preparation Machine operating at the plant of Pacific Coast Aggregate, Inc., Centerville, Calif.



IMMEDIATE DELIVERY
WEMCO Sand Pumps and parts are available for immediate shipment. For prompt delivery call your nearest WEMCO office.

Today's market demands **clean, dry** sands — sands that meet exacting specifications.

WEMCO Sand Preparation Machines are specifically designed to produce:

- **CLEANER, DRIER SANDS**

...scrubbing effect of WEMCO spiral and dewatering action of unit remove deleterious matter and water.

- **SPECIFICATION SANDS**

...with maximum recovery of desired sands. A machine to meet every need. Controls excess fines, slime and medium fractions.

- **MAXIMUM PRODUCTION**

...exclusive WEMCO design provides maximum sand raking and overflow capacities. Automatic operation assures continuous production with minimum attendance.

Reduced operating and maintenance costs are assured — WEMCO Sand Preparation Machines are noted for simplicity of operation and durability of construction.

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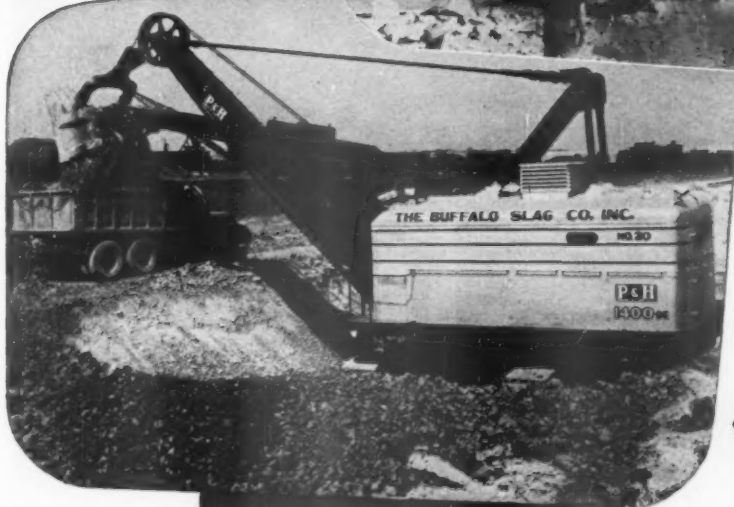
WEMCO

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Sand Pumps • Conditioner and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

For Rock Bottom
Costs
From Start to
Finish!



START . . . FLUXING STONE
A P&H Model 1400 Diesel-Electric
(4 yd.) shovel, owned by Drummond
Dolomite Inc. at Drummond Island,
Michigan.



FINISH . . . BLAST FURNACE SLAG
A P&H Model 1400 Diesel-Electric
shovel owned by the Buffalo Slag
Co., Buffalo, New York.

P&H DIESEL-ELECTRIC SHOVELS

with **MAGNETORQUE*** HOIST DRIVE

Now, you can have electric shovel efficiency *anywhere* with a P&H Diesel-Electric quarry and mining shovel. It's a complete electric shovel . . . with the addition of a diesel engine to furnish power . . . entirely independent of high line service.

Years of the toughest rock digging have proved the P&H Diesel-Electric

from every standpoint . . . dependable operation . . . less maintenance . . . rock bottom tonnage costs.

This simplified P&H Diesel-Electric shovel is made possible by the exclusive P&H Magnetorque Hoist Drive. Hoist generator, hoist motor, slip friction clutch and other mechanical devices are completely eliminated. Magne-

torque is only one of many P&H Added Values. Ask for Bulletin X83-DE.

Every Third P&H Electric
Shovel Sold is a Repeat Order.

P&H

**ELECTRIC
SHOVELS**

4445 West National Avenue
Milwaukee 14, Wis.

**HARNISCHFEGER
CORPORATION**

*Trade-Mark of Harnischfeger Corporation for electro-magnetic type clutch



SMIDTH

ROTARY KILNS

Over 950 Smidth Rotary Kilns have been supplied, some over 500 feet long.
The total capacity corresponds to one-half the World's production of cement.

For Smidth Machinery apply to:

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"WE HEAR..."

January, 1951

Indiana State Highway Commission is going to let the public decide the relative merits of concrete and black top paving, according to an announcement by Chairman Samuel C. Hadden. A test strip will be built on US 31 between Amity and Columbus using both types of surfaces, then motorists will decide on the basis of service over the next few years which material they consider best for roads.

Scientists at the National Bureau of Standards have developed a new structural twist: a new type concrete in which air bubbles are substituted for sand. The many tiny air bubbles enclosed with material replace the sand used in ordinary concrete. The bubbles make the product lighter in weight, a better insulator against heat or cold, and more resistant to water penetration, the scientists say.

Gravel pits should not be filled in, but rather should be converted into water parks, a Denver city official recommended recently. They could be so converted at very little expense and the cost of maintaining them would be very little, he pointed out.

Under construction in Topeka, Kan., is a building of block composed of 90 percent earth and 10 percent cement. The block are called Terracrete and they are made by a Topeka building block machine concern. A pilot model block machine is said to be capable of turning out about ten block per minute.

Foremost among the 1950 activities of the Alaska Road Commission was formulation of a large program of highway construction, reconstruction and maintenance. More than 200 miles of new paving is planned and the maintenance program is 36 percent greater than that of the previous year.

Construction contract awards in the 37 states east of the Rockies in November totaled \$1,087,062,000, or 14 percent more than the total for November, 1949, according to a F. W. Dodge Corp. report.

In an enjoining action taken against a Louisiana sand and gravel concern complaint was that water dripping from trucks had made the road a quagmire and that residents declared their property had been "flooded" on occasion by water dripping from trucks.

Men and women workers, 75 years and over, are reminded that under the new Social Security Amendments they may be eligible for monthly benefits whether or not they are now working in employment covered by social security and earning more than \$50 per month.

The Federal government recently divided up a \$400,000,000 appropriation in aid to states and territories for road building. Shares awarded by the Bureau of Public Roads on the basis of area, population and road mileage, ranged from \$1,606,335 for Delaware to \$25,141,039 for New York.

WE HEAR

Crews of workmen were recently pouring gold-bearing concrete for more than a mile of sidewalk in Lillooet, British Columbia. The gravel was taken from the banks of famous Savoosh creek, scene of much gold-panning in the gold rush days. Workmen didn't bother to pan the material, which old timers declared would not yield more than a few dollars for 12 hours of work.

* * * * *

There is little possibility of a serious housing shortage anywhere in the country in 1951, despite an expected decline in new home building of 25 to 35 percent, according to the United States Savings and Loan League. Even with a big cutback in residential building a "tight" housing supply is anticipated in 1951 in less than one-fifth of the nation's towns and cities, the league said.

* * * * *

Biologists of the Nebraska Game Forestation and Parks plan to utilize sand and gravel pits in a study of improvements in fish and plant life. Surveys are being conducted in various pits in the state in attempts to provide better fishing waters, with samples of water being taken to determine the extent of microscopic organisms and other plant and animal life to serve as food for fish found in the ground water-fed pits.

* * * * *

The average American farmer can expect a substantial increase in his gross income in 1951, according to a late estimate from the Department of Agriculture. Gross farm income is expected to be ten percent or more above the level of the estimated 1950 level of \$31.8 billion; this would exceed the record highs of 1947 and 1948.

* * * * *

Engineers working on a new railroad cut in Missouri that shortened the Kansas City-Chicago run by 22 miles really did a job of precision blasting. Side cuts through shale and limestone were blasted so accurately as to require practically no extra work to match the theoretical slope of 1 on $\frac{1}{4}$, reports Engineering News-Record. It was done by shooting 400 to 600 holes at one time, in four delays of 50 milliseconds each.

* * * * *

On the basis of the National Defense program for 1951, the rubber industry should be able to supply all military and essential civilian rubber product needs in 1951 without alarming shortages. This picture could be changed, however, by fresh outbreaks in the crude rubber producing areas of the Far East or by all-out war. However, the government took over control of the rubber industry on December 28, 1950.

* * * * *

A versatile form of building block requiring no mortar between joints is made with rough wood shavings, chemically mineralized and mixed with cement. Extremely rough in texture, these block can be piled up, cement can be poured into their standard core holes to tie them together to form pillars of support, and will spread sufficiently between the block to fill the need for mortar.

* * * * *

The theft of an estimated 283 sacks of cement was reported by a Nebraska contractor from a construction project for government grain bins. Officials said the loss became known when the supply of cement ran out before it was supposed to. There are similar reports coming from the other metropolitan areas.

* * * * *

Michigan, Wisconsin and Minnesota, through an interstate boundary committee, have reached an agreement, ratified by an act of Congress, to place concrete monuments on the shores of Lake Michigan and Lake Superior for the purpose of marking the water boundary between these three states. Two concrete markers will be placed at each reference point.

THE EDITORS

MACHINERY FOR CEMENT—LIME—ORES

F. L. SMIDTH & CO. Manufacture the Following
Complete Line of Modern Machinery for Cement,
Lime and Allied Materials, the Sintering of Ores, etc.

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UNIKOM multi - compartment grinding mill.

KOMINUTER for wet and dry grinding.

BALLMILL for granulating.

TUBEMILL for wet and dry pulverizing.

TRIX for grading wet granulated material.

TIRAX MILL for drying and grinding.

ATOX, air swept, vertical shaft pulverizer.

PYRATOR for drying and grinding.

SPRAY CASINGS for pulverizers.

CYLPEBS metallic grinding bodies.

DRAGPEB metal lining for pulverizers.

SILEX flint liners for pulverizers.

AIR SEPARATORS and Cyclones.

AGITATORS for mixing and storing wet mix.

AIR DISTRIBUTORS for slurry tanks.

WASHMILL for disintegrating and mixing materials in water.

ROTARY KILNS for cement, lime, ores, etc.

UNAX KILNS, with integral cooler.

SUCTION GRATE ROTARY KILN.

ROTARY KILNS—Sintering and roasting.

PRE-HEATERS for rotary kilns.

UNAX COOLERS, cooling drums on kiln.

UNAX GRATE COOLER, air quenching.

UNAX PRE-COOLER.

F.L.S. MULTI-TUBE ROTARY COOLER.

F.L.S. INCLINED GRATE COOLER.

COOLERS, Cement Ores, etc.

CHAIN SYSTEM for wet kilns.

HEAT EXCHANGERS for dry kilns.

KILN CONTROL, electrical

GAS ANALYZER, electrical.

KILN EQUIPMENT, fans, hoods, dampers, spouts, airseals, dust chambers, multiple gas discharge.

FLUXO PACKER for filling bags.

EXBINER for discharging bulk cement.

EXTRACTORS, cement from silos.

SKIPULTER shaker conveyor.

CYLCUP distributing conveyor.

PNEUMATIC FEEDERS.

SLURRY FEEDERS for kilns and mills.

CRADLE FEEDERS for coal, rock, clinker.

TABLE FEEDERS for coal, rock, clinker.

COAL FEEDERS for rotary kilns.

COAL BURNERS for rotary kilns.

GAS BURNERS for rotary kilns.

OIL BURNING EQUIPMENT for kilns.

SYMETRO Drive, speed reduction units.

PUMPS for heavy liquids as cement slurry.

FLOURMETER for determining micron sizes and finely ground cement, etc.

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F. L. Smidth & Co. are also engineer specialists in designing and equipping factories for making Portland cement and other allied materials, having devoted their efforts along these lines for a period of over fifty years.

Their engineering services include all stages of the project from the preliminary investigation of the site and raw material deposits, chemical and physical tests of the raw materials and finished product, to

all necessary drawings and specifications for erecting and equipping all departments of the plant, including also the electrical engineering.

This service applies equally well to complete new plants or any special department of a plant—to revisions or conversions of existing plants—making standard Portland cement, slag cements, white cement, or for making special high early strength cements, such as "VELO."

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is the most important factor in keeping Rotary Kiln Costs down — and profits up. One breakdown can easily offset all of the savings achieved through careful firing and feeding for a long period of time.

That's why every part of every Vulcan Kiln is designed and built with an extra margin of protection against mechanical troubles of any kind and that's why long-time users of Vulcan Rotary Kilns, Coolers, Dryers, Retorts, etc. often order additional units from us without competition. They know that any necessary difference in first cost will be repaid many times over in greater freedom from breakdowns, shutdowns and other operating expense.



This Booklet Tells Why Vulcan Kilns Are Better

and why they give more years of trouble-free service. It's 28 fully-illustrated pages are packed with specific information regarding the design and construction of Vulcan Rotary Kilns, Coolers, Dryers and other related products. No charge or obligation. Write for Bulletin No. A-442. Give name of your company.



The illustrations above show a typical installation of Vulcan Rotary Kilns in a modern cement mill. Note the simple, sturdy design and construction — the entire elimination of any features that might invite mechanical trouble. The improved-type firing hoods were designed for burning pulverized coal but can easily be adapted for burning either gas or oil.

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United Mineral Products strips 200 cubic yards per hour with the TD-24

Thick overburden at United's Weeping Water, Nebraska, quarry used to be stripped by hired dozers. A big TD-24 with matched scraper now does the job faster, cheaper.

Owner Gus Nelson tells about it: "This TD-24 will pay for itself in three years from savings over our old cost of hiring tractors by the hour. Besides, with TD-24 we move double the amount of earth every day. We would have saved a small fortune if we had the TD-24 a few years back."

For any stripping or removal job, the TD-24 has the power—delivers 148 maximum horsepower at the drawbar. Moves capacity loads with each pass. Works faster. You "shift on-the-go" with eight forward speeds, eight reverse, with International's exclusive synchromesh transmission and instant high-low range shift.

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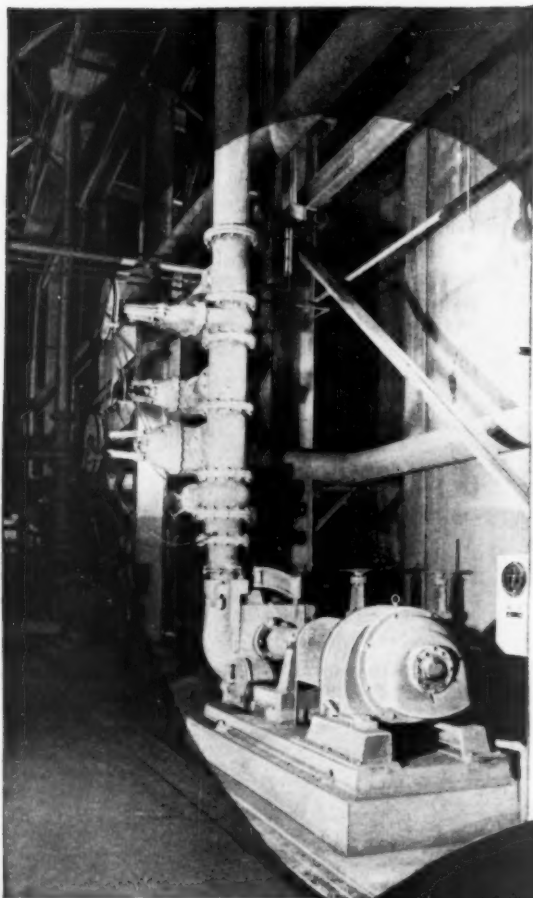
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Stripping for limestone: TD-24 and scraper on the job for United Mineral Products.

power that pays



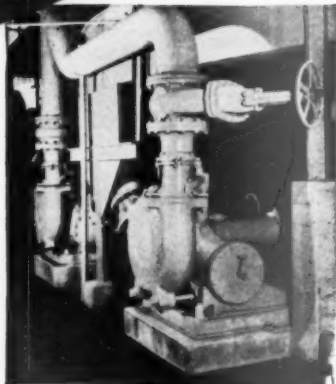
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A 4-71 GM Diesel engine drives two 10" x 20" crushers, 70' x 24" conveyor and 3' x 10' double deck screen. This plant has enabled Sequatchie County—one of the smallest in Tennessee—to have one of the best county road systems in the state.

35 Tons an Hour

- fuel cost 1-2/3¢ per Ton

WHEN a GM 4-cylinder Diesel replaced another make engine on this rock crushing plant operated by Sequatchie County, Tennessee, the surplus power enabled Road Superintendent Chester Allen to add a *second* crusher.

In this unique installation, with one engine driving the entire plant, production has doubled to 35 tons per hour. Fuel cost is less than 1 2/3 cents per ton produced. No repairs in over a year of operation.

Reasons for this superior performance are clear. GM Diesel engines are 2-cycle—with power on every downstroke. They flivver a smooth, steady

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GENERAL MOTORS

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Here is a complete gravel crushing, screening and washing plant for the production of aggregate for use in building or highway construction.

With the sizes of units used, total plant capacity is approximately 100 tons per hour. If desired, larger units could be used to increase production to 200 tons per hour, or more.



The enlarged and flared lower end of the tank provides the large settling area that is necessary to reclaim fine sand.

The plant has facilities which insure the production of properly washed and graded aggregate—a fine and a coarse sand, and two sizes of stone. If desired, additional sizes of product can be made.

Because of the simple arrangement, operating costs are held to a minimum. One man is all that is needed to operate the plant. A generator set provides power for the entire plant, including a water pump using about six gallons of fuel per hour.

Two Eagle Fine Material Screw Washers, of the type shown in the accompanying photograph, operating in series, deliver the two sizes of clean graded sand. Similar washers, but without the flared lower end, are used for the stone, to insure the thorough scrubbing action which guarantees clean rock.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A





Editor's Page

A Program for Public Relations

OUR FRONT COVER PICTURE this month might at first glance appear to be an inappropriate choice for a technical publication. Attractiveness of the Kodachrome from which the reproduction was made was a consideration in our selection but there are practical aspects of far-reaching implications represented that should command serious attention by all the rock products industries.

As we look back over the past year, many instances have come to our attention where companies have run afoul of zoning laws that threaten their very existence. Companies have been refused permission to establish plants or have been granted permits to begin operations, only after posting of surety bonds guaranteeing compliance with a required program of rehabilitation. Other concerns which have been established for years in a locality have had to defend themselves through costly litigation in order to continue large-scale operations that represent heavy capital investment. It is entirely possible that a producer of aggregate will find that an adjoining piece of property, which he owns, may have been zoned out of his reach when he gets ready to start excavation.

Our cover picture shows one of the most effective ways to guard against public disfavor that may lead to new zoning regulations. It shows the end result of a planned program of land rehabilitation that has been more than a job of reclamation. The property is far more attractive than it ever was, before being excavated for sand and gravel, and has provided everything in the way of outdoor recreation facilities that a community could desire.

That the owners, the American Aggregates Corp., were so foresighted and public-spirited, many years before the current agitation against aggregates plant operations, has paid richly in public confidence and good will. Through the company's established reputation for rehabilitation programs like that at Wayne Lakes Park, the company has been enabled to secure permit renewals where otherwise it is doubtful that they would have been granted.

The increasing value of property surrounding metropolitan areas, as suburban communities are created, is one contributing factor but the widespread development of rural zoning has become probably the most serious threat to the future of the industry. State statutes grant political subdivisions the power to effect zoning and to impose limitations on the uses to which land may be put, which means that even emotional reactions are likely to influence whether or not a concern may

continue in business.

For various reasons, the sand and gravel industry and other divisions of the rock products industries are not popular in the minds of the public. They have been unjustly accused of being public nuisances in many instances, particularly during this past year, but there are a minority of producers who, because of their "to hell with the public attitude," have contributed unnecessarily to the industry's hardships.

We have come to the time when dereliction on the part of industry will not long be tolerated. The public is critical of sloppy-looking plants, hazardous conditions which are permitted to exist, marring of the countryside, loss of land values, noise, dirt, stream pollution, and the indifference to the rights of owners of adjoining properties which is too often evident.

Protecting Exhaustible Reserves

One of the glaring weaknesses of the industry is that it is not understood by the public, which suggests that a public relations program based upon the adoption of sound practices, including land reclamation, is the logical basis for protecting its interests.

Those who have been confronted with new zoning regulations are aware of the threat to continuance of their operations and have begun an unprecedented search for available new deposits. It would be well for all enterprising producers to take inventory of their resources and to provide reserves of acceptable materials regardless of whether or not they now face the threat of zoning regulations.

Zoning is bound to make inroads into the available reserves of suitable materials but the impact of actual depletion of deposits can be forestalled if the industry takes the initiative to prevent being zoned out of business. We have reached the time when deposits of aggregates, which can be processed to meet modern specifications, are no longer expendable. Peak demands of the last few years have been bringing home to some producers that their deposits were no longer inexhaustible. The construction outlook indicates that whether the emphasis be on civilian or military work, the drain on the supply of aggregates will continue heavy and likely be tremendous in certain areas.

Bron Nordberg

AN EAGLE LOG WASHER WAS

**"JUST WHAT
the DOCTOR
ORDERED"**



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Gifford-Hill & Co., Inc., for 25 years, one of the largest sand and gravel producers in the southwest, now operating 15 plants, were having clay trouble at their Fred plant in Trinity River bottoms near Dallas. A strata of tough plastic clay they encountered contaminated their sand and gravel so it could not pass Highway Department specifications. An Eagle 7'x24' Double Log Washer was installed—now material exceeds strictest specifications. The corrugated paddles cut loose even the gummiest clay—water currents rising from bottom of tub wash the loosened clay up and out!

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Rocky's NOTES

Nathan C. Rockwood

When Scarcity of Aggregates Develops!

IT IS NOT UNUSUAL at intimate meetings of sand and gravel producers to hear the fear expressed that we are rapidly exhausting many of our economically available sources of supply. This is all too evident, for example, in certain sections of Texas, where the only feasible sources for concrete aggregates near large cities are shallow deposits in the flood plains of present or prehistoric streams. Obviously, to avoid uneconomic haulage costs from distant sources, when these local deposits are exhausted, producers must search for new local sources at constantly increasing costs.

The situation of the aggregates producer is further complicated by a growing hostility on the part of neighboring land owners to sand and gravel or quarry operations, partly because they may be dusty or dirty or noisy, and partly because they are apt to destroy or mar an otherwise attractive landscape. This gives rise to zoning laws and zoning commissions and authorities, whose powers in the United States are seldom clearly defined, and being political bodies, their decisions are too often influenced by political or even financial considerations. In other words, there exists keen competition for utilization of the land, with seldom the facilities for scientific analysis and truly judicial determination of which particular utilization is most in the public interest.

Example of England

In a small, thickly populated country like England, this problem is already acute. Hence, how it is met there by a socialist government is of general interest, since in our own country we have always had a propensity to follow England's example. We hope that will not lead us to adoption of similar socialism, but nevertheless there are some angles to the English approach to this particular problem which may have advantages to the producer, or the potential producer, as well as to the public. For this approach recognizes that the supplying of construction materials for public utilities, including housing, or to industrial enterprises which support a community, is in itself a species

of public utility.

Something like two years ago the English government established a Ministry of Town and Country Planning. We are not too well informed on the powers of this authority, for we have available only a "Report of the Advisory Committee on Sand and Gravel, Part 6, West Yorkshire," which an English friend has sent us because it covers the particular locality in which he operates. Apparently, similar advisory committees are established for each industry. The purpose of this committee is defined in the introduction:

"To make recommendations on the future policy for the control under the Town and Country Planning Acts of the extraction of sand and gravel, with particular regard to the following: (a) the need for maintaining adequate sand and gravel supplies at a cost which is reasonable in all the circumstances; (b) the need for ensuring that the necessary disturbance to agricultural land is reduced to a minimum and confined as far as possible to land of less agricultural value; (c) the need for coordination between sand and gravel working and other land use, including the need for the protection of amenity; (d) the need to ensure that land from which sand and gravel has been extracted is as far as possible employed for some useful purpose, with due regard to amenity; (e) any special aspects of the problem affecting particular parts of England and Wales."

The reader will note the phrase "with due regard to amenity," which is new in our common vocabulary of the industry. It is not even listed in some of our dictionaries; it is an English legal term and refers to "the defacement of grounds, especially around dwelling houses, or to annoyance, caused by building a railway, construction of public works, etc.," and can be a cause for damage suits. In a more general sense it means "the quality of being pleasant or agreeable in situation, prospect, climate, temper, disposition, manners, etc." Hence, its application to a sand, gravel or quarry operation is readily understood.

The chairman of the Sand and Gravel Advisory Committee is an engineer of national reputation, and the membership comprises representatives from the Ministries of Works, Agriculture and Fisheries, Town and Country Planning, the Association of Municipal Corporations, the Urban District Councils Association, two from the Ballast, Sand and Allied Trades Association, two professors of geography, with a secretary and assistant secretary.

Work of Committee

The committee supervises surveys and test borings of, so far as possible, all available sources of supply, and the markets, or consuming centers to be served. Based on present and prospective demands, and the probable yields of the areas surveyed, the committee attempts to provide sources of supply for some 50 years ahead. It surveys the quality of materials in each locality or region and the methods employed, or which can be employed, to extract the sand and gravel. There are a surprising number of factors to be considered, in addition to economic ones. For example, where excavation will have to be carried below ground water level, this must be done so as not to interfere with or pollute public water supplies.

Where it is feasible, without too great cost, the sand and gravel producer may be required to save the top soil, or stripping, and replace it so that the land may be returned to agriculture, which is important in a country that is unable to produce enough food for its inhabitants. The committee recognizes that so far as possible it is desirable to extend the workings of present operators, rather than compel the opening of new, usually small deposits elsewhere. In other words, they would preserve what we in this country call "permanent" plants rather than promote temporary or portable ones in new locations.

However, the committee is very sensitive to "monopoly" and wherever possible provide in their surveys for what they term "elbow room." This means to designate land not now under the control of producers which may be set aside for future competitors. It is not possible therefore for producers to keep to themselves a private knowledge of potential sources.

Apparently, the authority of the national advisory committee does not go beyond recommendations to the local planning authorities, which presumably have the power to set aside land they consider essential to the public interest exclusively for production of sand and gravel. Presumably much land is not owned by individuals, in fee simple, as in our country, but in any event, the local planning board has a right of eminent domain to use land as it sees fit. There are certain costs and assessments which are charged against the developer, who evidently does not have to purchase the land.



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LABOR RELATIONS TRENDS

Company Pension Plan Problems

By NATHAN C. ROCKWOOD

DURING THE SIX MONTHS since the Warner Co., Philadelphia, Penn., put into effect the pension plan, published in detail in our June issue, a number of other rock products producers and manufacturers have adopted, or are in the process of adopting, employee pension plans. The Warner Co. plan was one worked out by the company directors and offered to employees, whose unions would permit them to accept it. As of July 1, two of the several unions the company had contracts with had refused to accept the company plan. Until these unions accepted the plan, the employees involved were still eligible for pensions under a previous pension system, based presumably on a pay-as-you-go basis. The new plan is based on a trust fund, provided entirely by the employer.

Nearly all the pension plans we have seen or heard of since then are also based on trust agreements, independently administered for the exclusive benefit of pensioners and prospective pensioners. This method is much more economical in the long run, because if the plan is approved by the Bureau of Internal Revenue of the U. S. Treasury Department, the sums donated to the trust from the company earnings, or profits, are exempt from corporation income tax, as is also the interest or dividend income earned by the trust fund itself. The problem of employers has been, what kind of a plan will the Bureau of Internal Revenue approve? Most of these pension plans are so worded that they do not become effective until the Bureau of Internal Revenue does approve, or they have a provision that they can subsequently be modified to conform to rulings.

Any business executive who lived through the 1930's is reluctant to enter an agreement which guarantees pensions into perpetuity, knowing the economic hazards involved in any business enterprise. Therefore, it has been the custom where it is necessary to sign contracts with unions, covering pension plans, to set up the plan for five years. The best example we have seen of this kind of an agreement is one dated July 11, 1950, between the Ideal Cement Co., Denver, Colo., and the United Cement, Lime and Gypsum Workers International Union (A. F. of L.). The officers of the International signed, not local officers, and the agreement covers all the company's plants.

Article VII of this agreement provides that it "shall continue in effect until July 31, 1955, during which period neither the company nor the union may demand any change in its

provisions, nor shall either party be required to bargain with respect to pensions, except as provided in Article III, Section 2. The paragraph referred to reads as follows: "In the event any other annuity pension or payment of similar kind becomes payable to a pensioner by reason of any law of the United States, or any political subdivision thereof, which shall be enacted and which shall require that such benefits be provided by premiums, taxes or other payments paid by or at the expense of the company, the parties hereto will meet to negotiate the extent to which such benefits will affect the pensions provided under this plan." The plan adopted was exclusive of the Social Security pension as of that date.

Permanence of Plan

On November 9 the Bureau of Internal Revenue passed on the acceptance of such an agreement under its code and found no objection to a five-year term or limitation, on the assumption that such a plan was to be continuing and permanent, and the five-year provision was merely for possible amendment. The inference is that any attempt on the part of the employer to reduce the amount of pensions or discontinue the plan once it is established might result in rough treatment of the corporation, such as going back over the years that tax deductions were taken and demanding that the corporation income tax be paid for those years, except insofar as stopped by the three-year statute of limitation.

Nevertheless, nearly all these pension plans contain a clause which permits the board of directors of the corporation to modify or terminate the plan at their discretion. In the case of the Ideal Cement Co. agreement, apparently there can be no release of the company obligations to contribute the full amount required for the Trust Fund during these first five years, or in fact, ever. In Article VII of this agreement, it is stated: "After July 31, 1955, the pension agreement shall be automatically renewed for successive one-year periods unless either party to the agreement has given written notice to the other at least 60 days prior to August 1, 1955 (or any subsequent anniversary of the effective date of the plan) of its desire to amend or modify this agreement. If such notice be given the pension agreement and the provisions of the plan shall be renegotiated with respect to those provisions specified in such notice." Possibly this could be construed that "modification" of the agreement means its termination alto-

gether.

The Bureau of Internal Revenue does, however, recognize valid reasons for terminating a pension plan and these include bankruptcy, insolvency of the trust fund or the corporation, changes in ownership in which an entirely different personnel might take over, or even in case of proved financial inability to continue a plan. But apparently mere failure to earn a satisfactory profit in the judgment of the company directors would not justify reduction or termination of a pension plan, because the agreed upon donations to the trust fund are a business expense and not technically a part of the profits. They are a charge against the current assets of the company, at least in the year in which they occur.

The particular pension plan passed upon by the Bureau of Internal Revenue provided a fixed benefit of \$100 per month without the Social Security pension offset. The Treasury regulations require that the benefit "be definitely determinable." Most of the other pension plans provide for a maximum of \$100 including the Social Security, as it was prior to the recent increases. The Ideal Cement Co. agreement is for \$50 per month plus \$1 for each year in excess of 25 years' service. For 35 years or more, the pension goes to \$60 per month, and if his average annual earnings during the five years immediately preceding his retirement are \$4000 or more, the pensioner can get a maximum pension of \$63 per month. These amounts are independent of any Social Security pension.

Comprehensiveness of Plan

The pension plans we have seen, with the exception of the Warner Co. plan, are confined to employees paid on an hourly basis. This appears to be the preferred way, because the Treasury regulations are specific in stating: (Sec. 165, 3B) "Such employees as qualify under a classification set up by the employer, and found by the Commissioner not to be discriminatory in favor of employees who are officers, shareholders, persons whose principal duties consist in supervising the work of other employees, or highly compensated employees. (4) If the contributions or benefits provided under the plan do not discriminate in favor of employees who are officers, shareholders, persons whose principal duties," etc. It would appear preferable to handle pensions for executive personnel in a separate plan, in order to avoid any taint of discrimination.

It appears that in the case of a corporation which must deal with several national or international unions, the only way to handle a pension plan is for the corporation to adopt one and offer it to their employees on a "take it or leave it" basis. However, there is a catch in this, too, for the Revenue Code provides: (Sec. 165 3A) Seventy per centum or more of all

(Continued on page 130)

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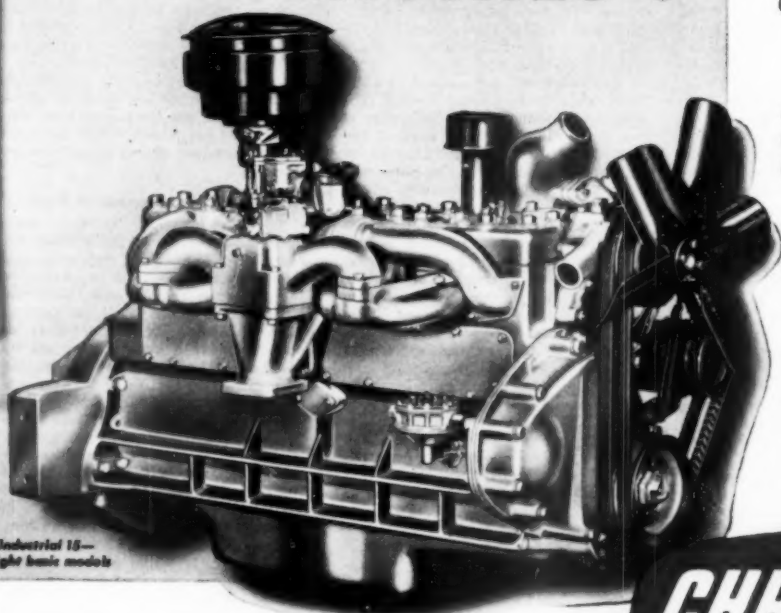
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HORSEPOWER WITH A FUTURE

the *Personal Side* of the news

P. C. A. Chairman

SMITH W. STOREY, president of the General Portland Cement Co. and the Consolidated Cement Corp., Chicago, Ill., has been elected chairman of the board of directors of the Portland Cement Association. He succeeds Walter C. Russell, president of the Peerless Cement Corp., Detroit, Mich., who has served as chairman of the board for the past two years. The following new directors have been elected: Donald S. MacBride, president, Hercules Cement Corp., Philadelphia, Penn.; F. A. Weibel, president, Allentown Portland Cement Co. and vice-president, Valley Forge Cement Co., Catawauqua, Penn.; Eugene D. Hill, president, Louisville Cement Co., Louisville, Ky.; and Harold M. Scott, president, Keystone Portland Cement Co., Philadelphia, Penn.

Mr. Storey has served the Association for many years. He was first elected to the board of directors in 1933, and has also served as treasurer and as a member of the executive committee. He was graduated from the University of Indiana in 1917 with a Bachelor of Laws degree. He has been associated with the cement industry for more than 25 years. In 1935 he became president of the Consolidated Cement Corp. He has been president of the General Portland Cement Co. since its formation in 1947 as a result of the consolidation of Florida Portland Cement Co., Signal Mountain Portland Cement Co. and Trinity Portland Cement Co. He has been president of these predecessor companies since 1946.

The retiring directors are Ben W. Calvin, president, Aetna Portland Cement Co., Bay City, Mich.; H. B. Robeson, president, Nazareth Cement Co., Nazareth, Penn.; H. N. Snyder, president, Federal Portland Cement Co., Buffalo, N. Y.; and Erik Thune, president, National Portland Cement Co., Philadelphia, Penn.

Speaks on Cement

DR. L. E. COPELAND, senior research chemist of the Portland Cement Association, Chicago, Ill., recently addressed members of the Central Ohio Valley Section of the American Chemical Society in Ashland, Ohio. The subject of his talk was "The Nature of Hydrated Portland Cement." Dr. Copeland received his B.A. degree from John Fletcher College, University Park, Iowa, in 1930. The Ph.D. degree was conferred by the University of Chicago in 1941. From 1930 to 1939 Dr. Copeland was employed by the American Dry Milk Institute, Chicago. In 1941 he became research assistant under Professor W.

D. Harkins at the University of Chicago. He joined the staff of the U. S. Rubber Co. in 1942 in the general laboratories at Passaic, N. J. Since 1947 he has been senior research chemist in the research and development laboratories of the Portland Cement Association.

Elected Vice-President

LESTER CROWN has been elected vice-president and chemical engineer of Marblehead Lime Co., Chicago, Ill., according to an announcement by



Lester Crown

Wallace E. Wing, president of the company. Mr. Crown received his degree in chemical engineering from Northwestern University in 1946 and following graduation taught in Northwestern's School of Engineering. Later he attended and was graduated from the Harvard Graduate School of Business Administration.

Receives Award

IVY H. SMITH of Jacksonville, Fla., has been presented a Certificate of Award by the Southeastern Concrete Pipe Association in recognition and appreciation of the time, thought and untiring effort contributed by him to the successful organization and development of the Association.

Associate Chairman

R. ROY HARLEY, general office manager of the National Gypsum Co., Buffalo, N. Y., has been named associate chairman of membership enrollment for the Young Men's Christian Association.

C.M.M.A. Officers

L. GLENN SWITZER, general manager, Transit Mixed Concrete Co., Pasadena, Calif., has been elected president of the Concrete Masonry Manufacturers Association, Los Angeles, Calif. J. A. Allen, Hollystone Co., Inc., North Hollywood, Calif., has been elected vice-president; and Ira C. Lackey, Curtiss Merrill Concrete Co., has been named secretary-treasurer. The following directors have been elected: E. P. Ripley, General Concrete Products, Inc.; Homer C. Shirley, Superior Concrete Block and Building Supply Co.; R. F. Higgins, Hazard Concrete Products Co.; Wm. L. Dollimore, Ace Brick and Patio Supply Co.; B. C. Iliff, Pre-Cast Concrete Products Co.; and Wm. H. Kennington, California Brick and Tile Co.

Division Superintendent

O. L. STALCUP, assistant division superintendent of the Halliburton Oil Well Cementing Co., Casper, Wyo., has been promoted to division superintendent of the Rocky Mountain division. E. C. Stuart, field man at Hobbs, N. M., has been made district superintendent at Casper. H. P. Hearn, recently transferred from the Rocky Mountain division to the post of superintendent of the California division, was presented with a gift at a recent party held in Casper, Wyo., in recognition of his service to the company.

Assistant Treasurer

RALPH B. WITHERSPOON, assistant credit manager in the Kansas City, Mo., office of Universal Atlas Cement Co., New York, N. Y., has been appointed assistant treasurer, with headquarters in Pittsburgh. He succeeds Daniel V. Johnson, who has retired after more than 35 years of service with the corporation. Mr. Witherspoon started with the company in 1923 as cashier in the Independence, Kan., office, and four years later was transferred to the credit office in St. Louis. In 1929, he was advanced to assistant credit manager, later being transferred in the same capacity to Kansas City. Mr. Johnson began his career with U. S. Steel in 1914 as clerk in the St. Paul office of Illinois Steel Warehouse Co. and later served as car agent for Illinois Steel Co. in Chicago and Columbus, Ohio. He joined Universal Atlas in 1928 as salesman in Cleveland and, two years later, was transferred to the Pittsburgh credit office. In 1936 he was advanced to assistant treasurer and has since served in that capacity.

Manages Sales Division

ROBERT M. COOK has been appointed manager of the Strata-Crete sales division of Great Lakes Carbon Corp., New York, N. Y., according to an announcement by Henry L. Walker, Jr., executive vice-president. Mr. Cook, well-known in the oil industry, will handle two newly developed products for use in the oil field. Strata-Crete, which is a lightweight material for use in oil well cementing, and Strata-Seal, a lightweight additive for drilling muds to combat lost circulation. He will make his headquarters in Long Beach, Calif. Previously Mr. Cook was vice-president and general sales manager of the Security Engineering Co., Inc., and prior to that vice-president and general manager of International Cementers, Inc.

Lectures on Concrete

JOHN R. SNOWBALL, engineer for the Portland Cement Association in Ohio, recently gave a lecture on quality concrete at Ironton, Ohio, for engineers, contractors, architects, suppliers, students, and all others interested in concrete and concrete designs. The lecture was sponsored by the Goldcamp Sand and Gravel Co., Ironton, Ohio, and covered the latest developments in the handling of concrete mixes, including a discussion of air-entraining cement.

Keystone Appointments

THOMAS BARNES II has been elected chairman of the board of The Keystone Portland Cement Co., Philadelphia, Penn., succeeding the late William C. Fowles, Jr., who passed away recently. Harold M. Scott, who has been president since 1930, has been elected chairman of the executive committee. Mr. Scott is succeeded as president by Charles E. Shearer, formerly executive vice-president.

Superintendent Resigns

A. B. HUGHES has resigned as superintendent of the Auxvasse Stone and Gravel Co., Auxvasse, Mo., to devote his time to the management of his mercantile business at McCredie, Mo.

Re-elected President

A. L. R. SANDERS has been re-elected president of the Illinois Section, American Society of Civil Engineers, Chicago, Ill. Mr. Sanders is chief engineer for Hazelet & Erdal, consulting bridge engineers, and has been serving as president since the death of O. J. Jelinek, formerly airport consultant to the City of Chicago. Howard F. Peckworth, managing director of the American Concrete Pipe Association, Chicago, has been named 1st vice-president of the Society, and F.

W. Edwards, head of the Civil Engineering Department of the Illinois Institute of Technology, has been elected 2nd vice-president. Henry Miller, Chicago consulting structural engineer, has been named treasurer. Harold F. Sommerschild, structural engineer for the Portland Cement Association, is secretary, having been elected to a two-year term in 1949.

Heads Executive Committee

FRANK R. FIELD, manager of the asphalt operations of Esso Standard Oil Co., has been elected chairman of the executive committee of The Asphalt Institute, New York, N. Y., and Bernard E. Gray has been re-elected president. Herbert Spencer has been re-elected secretary; George R. Christie, treasurer, and John N. Smith, assistant treasurer.

Sawdust-Cement Block

ROMAN NEJELSKI, Fort Wayne, Ind., has announced a new formula for making featherweight sawdust-cement block. He stated that the block is produced from sawdust and a special cement formula, using a low-cost production machine. No special curing is required and the block can be air dried at temperatures above 70 deg. The block is 8 x 8 x 16 in. in size, is lightweight, can be sawed, nailed or drilled with conventional tools. Mr. Nejelski said that insulation value of the block is 12 to 20 times better than that of sand-cement block and twice that of fibered gypsum board. According to the inventor, the block will withstand heat of 2000 deg. from a blow torch for one hour and still not be too hot to handle—char on the outside being less than 1/4 of an in. He also stated that the block could be heated to a cherry red and plunged into cold water without chipping.

Besides the block, Mr. Nejelski has produced formulas for lightweight mortar, interior plaster and radiant heat sub-floor materials made from the same materials. He plans to license manufacturers to use his formulas for producing various types of building materials from sawdust.

Serves on Committee

COLONEL HENRY CROWN, chairman of the board of Material Service Corp., Chicago, Ill., has been appointed a member of the campaign committee of the Illinois Chapter of the Arthritis and Rheumatism Foundation.

Elected President

THORWALD W. BECKEN, vice-president, Cemstone Products Co., St. Paul, Minn., has been elected president and a director of the Lincoln Savings and Loan Association.

With Engineering Firm

JOHN B. WOODWARD, formerly senior engineer with Marquette Cement Manufacturing Co., Chicago, Ill., has joined the cement engineering firm of W. R. Bendy, St. Louis, Mo. After graduating from the Missouri School of Mines as a civil engineer, Mr. Woodward joined the Alpha Portland Cement Co. A year later he became associated with the Missouri Portland Cement Co., where he remained for 11 years. For the past two years he has been senior engineer with Marquette.

A. S. A. Director

LESTER S. COREY has been re-elected to the board of directors of the American Standards Association for a three-year term beginning January 1, 1951. He was first elected to the board for a one-year term in 1949. Mr. Corey is also a director of Permanente Cement Co., Oakland, Calif., and the Glazier Sand and Gravel Co., Seattle, Wash., and president of the Utah Construction Co., Ogden, Utah.

Rock Quarry Bidding

COUNTY COMMISSIONERS RECENTLY announced that all bids to lease the county rock quarry at McKelligon Canyon, Texas, would be thrown out and there would be a call for new bids. This decision was made after the commissioners had received protests on the way in which specifications for bids were drawn. The specifications for bids on the 2-year lease stated that if anyone other than the present lessee, Hugh McMillan, obtained the lease, the new lessee would have to buy all permanent improvements on the property. The estimated value of the improvements was listed as \$450,000. The county engineer stated that he had obtained the estimate of the value of the improvements from McMillan engineers. It included a \$100,000 item for "good will and business." Among other items in the inventory were offices and equipment, \$58,000; quarry installations, \$127,000; airhose and stock pile, \$75,000; and roads, \$25,000. In the call for new bids it was suggested that the improvements on the property be listed, but not their value, and that there should be more in the specifications than there is about the improvements. New bids for the lease will run for two years.

Executive Secretary

A. J. RAYNOR has been appointed executive secretary of the New York State Bituminous Concrete Producers Association, Schenectady, N. Y. He is also field representative of the Associate General Contractors of America and has been associated with the construction industry since 1907.

Associate Consultant

ROLAND D. PARKS of the Massachusetts Institute of Technology, Cambridge, Mass., has been appointed associate consultant for Behre Dolbear & Co., mineral consultants in mining, metallurgy, geology and management, New York, N. Y. F. Blondel of Paris, France, and Dr. Tadashi Inouye of Tokyo, Japan, have been appointed foreign consultants.

Assists Sales Manager

ALLEN CASSIN has been appointed an assistant general sales manager of The Celotex Corp., Chicago, Ill., supervising operations of the eastern sales branches. He will make his headquarters in Washington, D. C. For several years Mr. Cassin has been manager of the Cleveland branch and will be succeeded in this position by W. H. McAuliffe, formerly assistant manager of that branch.

Superintendent Resigns

JIM MCINRUE has resigned as superintendent of the Bethany, Mo., quarry of L. W. Hayes, Inc., Kansas City, Mo., and has returned to Chicago Heights, Ill. "Bud" Shields, area superintendent, who has been at the St. Joseph, Mo., plant, has been placed in charge of the Bethany quarry.

Director of Sales

M. B. GARBER, past chairman and for many years prominent in the Manufacturers Division of the National Crushed Stone Association and National Sand and Gravel Association, has been appointed director of sales for The Thew Shovel Co., Lorain, Ohio. Mr. Garber is one of the seven founder members of the Manufacturers Division of the National Crushed Stone Association.

Chief Engineer

FLOYD H. COMPTON has been appointed chief engineer of the Pennsylvania-Dixie Cement Corp., Nazareth, Penn., to succeed Stewart H. Dewson who passed away September 13. A graduate in mechanical engineering from Lafayette College, Mr. Compton since 1937 has been general superintendent and chief engineer of both the Allentown Portland Cement Co. and the Valley Forge Cement Co. He served as conservation engineer for the Portland Cement Association from 1920 to 1922, and was superintendent and chief engineer of Louisville Cement Co. from 1922 to 1937.

Projects Engineer

Cecil E. Rhodes has been appointed special projects district engineer in the Denver, Colo., office of The Asphalt Institute, New York, N. Y., to succeed Walter F. Winters who has been made chief engineer. He will be in charge of studies to promote asphalt for solving reclamation problems.

OBITUARIES

CHARLES P. HOOVER, superintendent of the Water Department of Columbus, Ohio, and a widely known water purification chemist, died November 14. He was 66 years old. Mr. Hoover was a graduate of Ohio State University and joined the Columbus Water Department in 1908. Several years later he was named chief chemist, and held this position until a year ago when he was appointed superintendent to succeed his brother, Clarence B. Hoover, who died a year ago. Mr. Hoover and his brother pioneered in water treatment processes and perfected many methods later adopted by cities all over the world. He is author of one of the National Lime Association's most popular books, "Water Supply and Treatment." The 6th edition of this book is now being printed and over 60,000 copies have already been distributed.

RALPH E. GIBBS, a consultant for the lime industry for many years, passed away recently at the age of 52. Mr. Gibbs graduated from Pennsylvania State College in 1921 with a degree in electro-chemical engineer-



Ralph E. Gibbs

ing. He was first employed by the York Ice Machinery Co. as chief chemist from 1922 to 1934, spending one year of this time at Johns Hopkins College in the study of chemical engineering. In 1934 he joined J. E. Baker Co. and remained there until 1942, when he formed his own consulting engineering service for the lime and paper industries. Mr. Gibbs was a member of the Professional Engineering Society.

GEORGE LANG, retired founder of The Cunard-Lang Concrete Co., Columbus, Ohio, passed away recently in Columbus. Mr. Lang established his company in 1909 and pioneered the use of concrete units in the Columbus area. He retired from business in 1945.

SIR CHARLES DAVIS, formerly managing director of the Associated Cement Co. of England, passed away on October 27 at his estate at Barrington Hall, Cambridgeshire, England, in the village where he started his career in the cement industry some 52 years ago. Educated at Weymouth College, Mr. Davis was a postoffice engineer until he became interested in cement after reading Meade's book on portland cement. He took over a derelict plant in the village of Barrington and operated it successfully until, in 1900, he built two plants, the Saxon and the Norman, at Cambridge. These he operated through years of fierce competition. For several years Mr. Davis lectured at Cambridge University in Engineering on the subjects of portland cement and concrete construction. In 1912, the Associated Portland Cement Manufacturers took over his plant and he was appointed a managing director. He was on the Board of the Port of London Authority, a member of Lloyds, High Sheriff of Kent, and finally Sheriff of London in 1942-43. He was knighted and then was elected Lord Mayor of London in 1945-46, after which he was made a baronet. Mr. Davis will be remembered as the author of the book, "One Hundred Years of Portland Cement." He succeeded in the title by his son, Gilbert, who will be remembered by his many friends in the cement industry in the United States before and during World War II.

FRED W. KUHLE, treasurer of The Kelley Island Lime and Transport Co., Cleveland, Ohio, died December 14 at his home in Parma Heights. He was 68 years old. Mr. Kuhl joined the company as an office boy more than 50 years ago. He attended night school and worked his way up until, in 1928, he was elected secretary-treasurer. A year ago, Mr. Kuhl relinquished the duties of secretary but retained his post as treasurer.

BERTRAM J. THOMPSON, superintendent of the Metropolitan Sand and Gravel Co., Port Washington, N. Y., passed away recently at the age of 68.

CARL GLEESING, owner of the Glesing Cement Co., Indianapolis, Ind., which he organized in 1923, died November 25. He was 62 years old.

EDWARD W. FITZGERALD, former safety engineer at the Oglesby, Ill., plant of Marquette Cement Manufacturing Co., Chicago, Ill., passed away November 20.

BERT CABLE, former superintendent of the Bonner Springs, Kan., plant of Lone Star Cement Corp., New York, N. Y., died November 4 at the age of 87.

J. GEORGE GEYER, who retired seven years ago as secretary and production manager of the Federal Cement Tile Co., Hammond, Ind., and Chicago, Ill., passed away November 14. He was 71 years old.

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INDUSTRY *News*



Illustration shows operations at the Union Pacific's perpendicular ballast plant at Inkom, Idaho. Rock is blasted from the mountain at the right. In the distance at right, a dump truck is unloading into the first of the two crushers. The belt conveyor in the background is carrying finished ballast to the surge pile that feeds into the hopper by the track. Two gondola cars being loaded from the hopper. The belt conveyor in the foreground is carrying waste to a second surge pile. On the valley floor, a long freight rail along rail ballasted by rock from Inkom operation. The winding stream is the Portneut river

Company Abandons Ship

KELLEY ISLAND LIME & TRANSPORT Co., Cleveland, Ohio, has announced that the sandsucker, the "John M. McKerchey," a 161-ft. vessel, will be abandoned where it sank last October, near Lorain, Ohio. A. B. Mack, vice-president of Kelley Island, said the insurance companies have been unable to get a salvage company to bid on recovering the 44-year-old ship, although divers have reported the hull is still in good condition. It is expected that the army engineers will remove the wreckage, as it is considered by the Coast Guard to be a hazard to navigation.

Big Cement Order

CALAVERAS CEMENT Co., San Francisco, Calif., has been granted a contract to furnish 1,600,000 bbl. of cement for the construction of Pine Flat dam, near Fresno, Calif. The order calls for Type II, low alkali cement and will amount to several million dollars. Announcement of the order was made by the company in connection with the publication by Calaveras of a company history, "Twenty-Five Years of Building the West," which

was issued in celebration of the company's 25th year in business.

Calaveras has more than doubled its capacity since the end of World War II and is now producing at the rate of 2,500,000 bbl. of cement a year, according to recent reports. It was also announced that the company has now begun another expansion program involving an investment of \$600,000 in new plant equipment.

Pumice Mining

THE SANTA FE PUMICE Co. completed one of the largest pumice mining operations in New Mexico in October, 1949, namely, the White Eagle Pumice Mine, located in Guaje Canyon. The engineers who planned the installation took into consideration the economies of locating the grinding and processing mill so as to utilize gravity to fill storage bunkers. The plant capacity is 100 cu. yd. of material per hour. A long inclined chute feeds raw pumice to the grinding machinery and screens, and large concrete bunkers at the base of the installation have a 1200-cu. yd. storage capacity for ground pumice. Complete plant installations cost approximately \$100,000.

Government Positions

THE UNITED STATES CIVIL SERVICE Commission has announced an examination for Commodity Industry Analyst (Minerals) for filling positions in the fields of ceramics, coal, iron and steel, mineral resources (foreign), minerals (general), nonferrous metals (except fuels), and petroleum and natural gas. The salaries range from \$3450 to \$6400 a year. Most of the positions to be filled are in the Bureau of Mines and the Geological Survey of the Department of the Interior in Washington, D. C., and throughout the United States. Some positions in other agencies in Washington, D. C., may also be filled from this examination.

Full information and application forms may be secured at most first and second-class post offices, from civil-service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications will be accepted in the Commission's Washington office until further notice.

Ideal Expands Again

IDEAL CEMENT Co., Denver, Colo., recently purchased surplus government property at Baton Rouge, La., and plans to construct a 3-kiln cement plant, wet process, as announced by Cris Dobbins, executive vice-president and general manager. Machinery and equipment located on the site was also purchased by Ideal from General Services Administration. Construction is expected to be completed by May, 1952, although plans have been made to place the plant in partial operation by midyear, 1951. In addition to the plant site and equipment already purchased, construction costs have been estimated at about \$4,000,000, and when completed, the plant will have an annual capacity of 1,500,000 bbl. of cement. Raw materials for the plant will be principally oyster shell and clay, both available for barge haul.

Vermiculite Plant in Hawaii

VERMICULITE OF HAWAII, LTD., Honolulu, Hawaii, is the most recent licensee of the Zonolite Co. The newly-formed organization brings the first of this type of industry to Hawaii. Principals of the firm are Walter W. Wohlforth and Thomas K. White. Officials of the Hawaiian company state that production facilities will make it possible for them to supply all Hawaiian building contractors and gardening supply houses requesting it.



This double roll crusher is driven by an International UD-24 diesel engine (right center) and a Murphy diesel, which cannot be seen in this picture. The 180-horsepower UD-24 at the left drives a generator furnishing power to electric motors on the conveyors and screens. Beyond it a 125-horsepower International UD-18A diesel drives the 20-36 Pioneer jaw crusher which provides the primary reduction. Site is new Chief Joseph dam in Washington

Crushing Plant

THE STRONG & McDONALD COMPANY of Tacoma, Wash., has erected a crushing plant on the bank of the Columbia River near Monse, Wash., for the purpose of providing material for access roads to the new Chief Joseph Dam. This plant is producing rock ballast and crushed rock in various sizes at an average rate of 200 cu. yd. per hour. The plant is powered entirely by diesel engines, used both in direct drive and in driving generators which power electric motors.

Urges Inventory of Manpower Requirements

ARTHUR W. MOTLEY, assistant director of the United States Employment Service, in a recent talk, gave information which should be helpful to the industry in developing plans for obtaining manpower replacements. He pointed out that with an unemployment level of less than 2,500,000, many of whom lack industrial experience, it is apparent that any sharp increase in defense production will have to be met largely by shifting presently employed workers into defense plants or by recruiting persons not now in the labor force.

"Employers will be well advised to avoid hiring policies that restrict the hiring of workers over 45 years of age," he declared, adding, "Companies practicing such hiring policies will be depriving themselves of some very excellent workers."

Calling attention to the "warm body" philosophy in hiring practice that was quite generally followed during World War II, which meant that if a person was alive he was hired and little or no attention was given to whether or not the worker had any particular skills or aptitudes. Mr. Motley declared that such a policy resulted in a high turn-over, increased costs, and did not speed up production.

Electrifies Plant

FEASTER SAND AND GRAVEL CO., Oxford, Kans., recently completed a changeover from gasoline to electric power for most of its equipment used at the sand pit.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of November and for the first eleven months of 1950 are listed by the Portland Cement Association as follows:

	Square Yards Awarded During November 1950	During First eleven months 1950
Roads	1,314,204	26,265,591
Streets and alleys	1,471,299	25,377,875
Airports	298,964	3,146,500
Total	3,084,467	54,789,966

Names Committee

HARRIS N. SNYDER, president of the National Sand and Gravel Association, pursuant to authority vested in him by the Board of Directors of that group, has appointed a Committee on Nominations, whose report will be submitted to the membership at the thirty-fifth annual convention at New Orleans, La.

The committee appointed is composed of R. N. Coolidge (chairman), Cumberland River Sand Co., Nashville, Tenn.; Alexander Foster, Jr., Warner Co., Philadelphia, Penn., and J. Rutledge Hill, Gifford-Hill & Co., Dallas, Texas.

Asbestos Production

ASBESTOS PRODUCTION in the United States reached a record of 42,918 short tons in 1949, 15 percent more than in 1948, according to reports by producers to the Bureau of Mines, U. S. Department of the Interior, Washington, D. C. Chrysotile was produced in Vermont and Arizona and some development work was reported in California. Amphibole output was reported from California, Georgia, and Oregon. Although demand in the United States was at a high level, imports from foreign sources were lower than in the record year 1948 because of the strike in Canada. Canada is the principal supplier of chrysotile, and small quantities were imported from Southern Rhodesia and Russia. South Africa supplied all of the amosite and nearly all of the crocidolite consumed in the United States.

Coming Conventions

January 22-25, 1951—

National Concrete Masonry Association, Annual Meeting and Concrete Industries Exposition, Cleveland Auditorium, Cleveland, Ohio.

February 5-9, 1951—

National Crushed Stone Association, 34th Annual Convention, and Agricultural Limestone Institute, 6th Annual Convention, Netherland Plaza Hotel, Cincinnati, Ohio.

February 8-9, 1951—

Wisconsin Concrete Products Association, 31st Annual Convention, Plankinton Hotel, Milwaukee, Wis.

February 11-15, 1951—

National Sand & Grav-

el Association, 35th Annual Convention, and National Ready Mixed Concrete Association, 21st Annual Convention, Roosevelt Hotel, New Orleans, La.

February 28-March 1, 1951

American Concrete Pressure Pipe Association, 2nd Annual Convention, Waldorf-Astoria Hotel, New York, N. Y.

March 1-3, 1951—

American Concrete Pipe Association, Annual Convention, Waldorf-Astoria Hotel, New York, N. Y.

March 12-14, 1951—

American Road Builders' Association, 48th annual meeting, Schroeder Hotel, Milwaukee, Wis.

Group's Counsel Clarifies Bargaining Action

A MEMORANDUM FROM Charles A. Horsky to Vincent P. Ahearn, executive secretary of the National Sand and Gravel Association considers the possible effect on group bargaining practices of the National Labor Relations Board in view of the Board's decision in a recent case. This decision, the memorandum indicates, puts employer group bargaining in a difficult position. It forbids outright discharge by an employer group to counter a piecemeal strike, in the absence of other factors. But it is still likely that it is possible for a group of employers (having some background of group bargaining) to lay off their employees in case of a strike against a single employer or a small number of employers. And, the memorandum indicates, it may still be possible for the employer group to protect itself by an advance agreement with the union or by getting Board certification.

Inquiry at the General Counsel's office of the Board indicates that the Board does not now have pending any cases involving the same sort of situation. Therefore, it may be some time before the Board gives an indication of its attitude on the question left open, the memorandum concludes.

Canadian Cement Plant

ST. MARY'S CEMENT CO., Toronto, Canada, has announced that the four-year expansion program at its St. Marys, Ont., plant will be retarded due to the necessity for frequency conversion of electric power in western Ontario. The first phase of the expansion program was completed in 1949 with the addition of a second kiln, which has an annual capacity of 720,000 bbl. of cement. A third kiln of the same capacity, with additional crushing and grinding equipment, is expected to be installed by 1952. Upon completion of the expansion program, total capacity will be about 2,100,000 bbl. of cement annually, as against a 660,000 bbl. capacity previous to 1946.

Limestone Operation

CORNELIUS LIMESTONE CO., La Cygne, Kan., has begun operation. High grade agricultural limestone testing 98.2 is being produced as well as road and concrete rock, according to owners R. H. Cornelius and his son, Raymond.

Opens Gravel Plant

RAY NELSON has announced the opening of a gravel plant just north of Greene, Mo. The plant will supply crushed and uncrushed gravel and washed sand for all classes of construction work and also for highway projects.



A belt conveyor (right foreground) carries crushed rock from the rock crusher to stockpiles on the side of Lee's Mountain, Arkansas. The rock is then carried seven miles to the \$78,000,000 hydroelectric and flood control Bull Shoals Dam site by means of a 21-"flight" belt conveyor (center). The dam site is barely visible (white speck, top center).

SOME INTERESTING cost figures have been made available relating to the seven mile belt conveyor installation at the Bull Shoals dam on the White river in Arkansas. These figures indicate that the total cost of the conveyor including clearing the rugged terrain, road building, power lines and installing motors, cost of conveying machinery and idlers, as well as 75,000 feet of standard rubber covered cotton fabric belt and installation totaled slightly less than \$1,250,000, of which the conveyor alone cost about one-half. The equipment, after handling about 4,000,000 tons of crushed rock is in good shape and at the completion of the job the machinery items and belt will have a salvage value of about \$250,000.

Thus on the basis of a seven mile installation the cost would be roughly \$143,000 per mile. There is an additional three miles of conveyors involved in related work. The second most favorable method of transportation on this job, it was indicated, would have been by trucks and it would have required 30 trucks and a road of sufficient stability to stand the traffic. These items would have cost some \$500,000 more than the conveyor, it was said.

The repair costs when the job was 90 percent completed have totaled less than \$2500 or about \$75 per month. Seven men per shift are used to keep the 14,000 idlers lubricated. A "one shot" lubrication of idlers is used so that the operating labor does not have to double back to lubricate both sides of the conveyor system.

The idlers are three tube-shaped

rollers placed every four feet with self-aligning idlers placed at strategic points. These were designed and supplied by Hewitt-Robins Inc., Robins Conveyor Division of Passaic, N. J.

In the seven-mile conveyor section there are 21 flights. Five generate enough power to run themselves and supply some additional power besides. The belt runs at 525 f.p.m. and carried 650 t.p.h.

The dam is being built under the supervision of the U. S. Army Corps of Engineers. The Ozark Dam Constructors and the Flippen Materials Co. are the prime contractors and M. H. "Harvey" Slocum is project manager. The structure involves some 1,800,000 bbl. of cement and the dam when completed will be the fifth largest in the world. Coarse aggregates are cooled by inundation with ice water and a refrigeration plant capable of making 625 tons of ice per day is available. The project involves a cost of \$78,000,000.

Sell Gravel Plant

BOLD BROTHERS SAND AND GRAVEL CO., Garrison, N. D., which has operated a sand and gravel washing plant for three years, has sold the washing equipment to Ray Nelson of Kenmare, who is moving the plant to Greene, N. D.

Vermiculite Handbook

Southern Vermiculite Co., Franklin, N. C., has published an illustrated vermiculite handbook describing the various uses and advantages of the product.

HINTS *and* HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Portable Fan Aids Worker Comfort

IN A NEW LIME OPERATION in a desert area of the West, where the daytime temperature reaches an exceptionally high figure, portable fans, one of which is shown in the picture, have been provided to circulate air in the working area. The fan is also used to cool large motors that tend to run hot, if necessary.



Portable fan cools workers in hot operation

Truck-Weighing Scale Markers

ON THE PACIFIC COAST, where a high percentage of the volume of sand and gravel is hauled by company-owned trucks, state laws are such that an unusually long wheel base between the front axle of tractors, or trucks, and the rear axle of the trailer is permitted (up to 56 ft.). When the material is sold by the ton, it almost is a necessity to have a scale platform that will allow the truck and trailer to be weighed as one unit. For rapid weighing, platforms in the 75-ft. range are used. To spot a long load on one of these platforms rapidly, one producer uses four large boulders as guides. He placed one near each corner of the scale platform so that the driver has something to go by when wheeling onto the platform.



Boulders aid driver in spotting long load on weighing platform



Ore car mounted on rollers is used to remove muck from small tunnel

Small Ore Car Facilitates Muck Removal

AT AN OPERATION IN THE WEST where a tough diorite is being quarried to supply aggregate for a 1,500,000 cu. yd. concrete dam, much of the rock is secured through the use of a battery of Chicago Pneumatic wagon drills augmented by hand-held air drills. The processing plant has a capacity of 600 t.p.h., so to secure that amount of rock from a newly-opened quarry where working space is limited, the coyote system of blasting is practiced along with the snake-hole drilling.

With this practice, the conventional "T"-shaped entry-way, or tunnel, is driven with a cross-cut at the underground end. Size of the opening is kept as small in cross section as possible. To facilitate removal of blasted muck from these small tunnels, the ore car illustrated is used. The two wheels are small rollers mounted near the middle of the car so that dumping of the muck is easy. The car travels on a plank runway.

Portable Crane For Incidental Jobs

THE LETOURNEAU "Tournecrane" has been observed in use recently at several western operations where a quick and convenient manner of lifting materials was needed, and where, ordinarily, a power crane would have to be used. In four weeks of travel, one of our editors ran across three of these units. The one shown is in use at a newly-opened quarry on Catalina

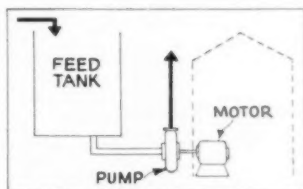


Portable crane being used at western quarry

Island. It has four 18.00 x 24 Firestone tires, with motive power furnished by a tractor. This particular crane was a war surplus item.

Installation of Pumps

ONE USER OF MANY PUMPS of the Wilfley type found it most advantageous to install his pumps outside and



Method of installing pump away from motor to avoid splashing the motor

to connect each pump to its drive motor placed inside a small building. Thus when runner or case had to be changed, or a gasket blown, the resulting splash of pulp usually accompanying these operations did not get into the motors. In this particular installation there were three 8-in. Wilfley pumps in a line pumping to a common header discharge line.

HINTS AND HELPS

Boom Extension for Scraper Tag Line Sheave

FOR FULL EFFICIENCY in the operation of scraper loaders, the tag line sheave must be mounted close to the heading to insure bringing the scraper well over and behind the muck pile where a minimum of work by the operator will cause the blade to bite in deeply, thus starting it out with a full payload. Illustrated is a device that can readily be assembled in the shop from salvaged materials. A 3-in. x 12-ft. pipe forms the boom with one end heated in the forge, beaten flat and pierced for the sheave hook. The other end is encircled by a $\frac{1}{2}$ -in. x 3-in. iron band welded on and providing a tab end. This extension is flame cut

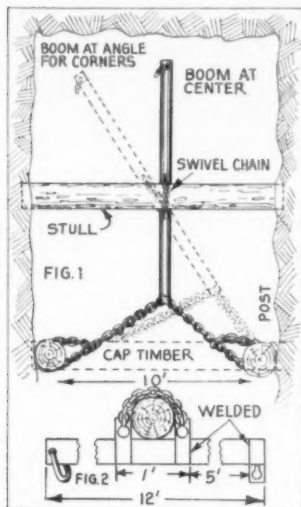


Fig. 1 (top): Method of using shop-made boom extension for scraper loader. Fig. 2 (bottom): Side view of boom showing chain over stull

to provide an opening to pass a $\frac{3}{8}$ -in. chain link. A hack saw is used to make a downward slot from the hole to form a grip for a chain link. This end is anchored to the cross chain tied to opposite timber sets at any point desired to bring the boom tip to center or right and left of the heading.

For the center chain attachment, a second band is welded on the pipe at the 5 ft. mark, and a third band is placed at the 6 ft. mark. The 6 in. extension protrudes upward. One is pierced to take a $\frac{3}{8}$ -in. ring of the chain, and the second is arranged with hole and slot to form a grip. Three ft. of chain serves to hang the boom on a temporary stull or on the timber cap where timber is brought up close to the heading. The stull is usually fastened by picking a "hitch" in the wall and driving in wedges. The heel chain must span the drift from post to

post with length sufficient to make two turns about the post at each end and must be equipped with grab hooks at the ends.

Correct Priming for Cold Weather Blasting

ONE BAD FEATURE CONNECTED with winter blasting, especially where such explosives as nitrated starch or similar powders are used, is that the force of compression is greater and faster than is the wave of propagation. This is particularly true in the smaller bore holes, i.e., those reaching a length of 10 ft. or more and ending in the small diameter of $\frac{1}{2}$ in. for the final length of drill rod used. At a certain value of compression, explosives will not always successfully detonate for the entire length of the drill hole. The answer to this problem does not lie in loading the primer in the hole first in order to defeat the compression, since under such conditions the detonation may still be quite ineffective; all too often the powder burns rather than explodes. An excessive amount of smoke is indicative of this condition.

This partial detonation may be overcome by one of two methods. The first is to use a higher grade of explosive for the initial two sticks. The second is to use an electrical detonator for about each 2 ft. of drill hole. Either method will run up blasting costs, but it is equally expensive to have incomplete detonation with the very serious hazard of mucking into unexploded charges. Secondary blasting is largely eliminated when every drill hole fires for its full length.

Spray Settles Dust on Trucks

TRUCKS AT THIS WESTERN sand and gravel operation have the dust on their loads settled before leaving by the spray device shown in the photograph.



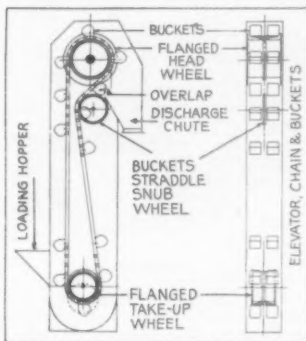
Spray boom extends over roadway to wet down dusty loads in trucks

This consists of a long pipe which extends over the roadway. Seventeen nozzles direct the water downward. When the driver approaches near the spray boom, he pulls a line hanging outside his window. This starts the

spray in time to wash off the cab, and it continues to run for a predetermined time until the truck and trailer have passed. The water is then turned off automatically.

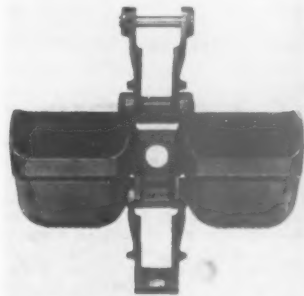
Bucket Elevator for Wet Materials

A BUCKET ELEVATOR that is used to handle a wet, relatively fine material, especially of high specific gravity, is an operating worry because of the difficulty of getting such material to dump out of the bucket properly. Such a bucket elevator will usually dump its load back down the elevator shaft instead of into the unloading chute. One solution for this type of elevator is to use a straddle-type bucket as shown in the illustration. With it a snub



Drawing showing route of buckets in elevator

wheel can be used and the speed of the bucket line slowed down so that a positive dumping action is obtained. Bucket elevators, if they work properly, have many advantages but most operating men shy away from them because of apparently inherent defects. The design of the bucket and lay-out as supplied here by Beaumont Birch Co., Inc., may help some operators who have elevator troubles and therefore deserves mention here.



Wet materials do not dump prematurely in this design of bucket elevator

New Machinery

**ROCK
PRODUCTS**

Battery-Powered Trammer

LOCOMOTIVE AND CAR EQUIPMENT DIVISION of the General Electric Co., Schenectady, N. Y., has developed a new 1½-ton battery-powered trammer for use in mine-haulage work. Small



Battery-powered locomotive

and compact, but powerful, the trammer is designed for use in metal mines where clearances are restricted.

Available in any track gauge between 18 and 24 in., the new unit is 71½ in. long over bumpers, 35½ in. wide and weighs 3000 lb. with its battery. Individual drive from the motor to each of two axles provides maximum tractive effort.

Rated drawbar pull of the trammer is 400 lb., but a maximum drawbar pull on level tangent track of 750 lb. is available. Maximum speed of the locomotive alone is seven miles per hour. Its speed at rated drawbar pull is three miles per hour. Tractive effort is furnished by a totally-enclosed four-pole d-c motor designed especially for battery-powered operation.

Redesigned Induction Motor

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has announced the redesign of its standard line of large, bracket-bearing, squirrel-cage induction motors of four and more poles. In the redesigned units, capsule-type sleeve bearings are standard. The split, cast-iron bearing capsule or housing has a machined flange for bolting to the bearing bracket, permitting removal of the upper half of the bracket for inspection or cleaning without exposing the inside of the bearing. Air discharge openings in the side of the stator yoke, protected by removable louvers, facilitate vacuum cleaning or

blowing out the air passages behind the stator core.

Since the only openings in the bearing brackets are in the air intakes near the bottom, the brackets afford protection for the ends of the motor, and the use of louvered panels in the stator air-discharge openings, makes the unit drip-proof. The air discharge openings also facilitate installation by providing adequate headroom for drilling and dowelling the machine to its foundation. Motors are available with special electrical modifications to suit application requirements, and can be obtained with anti-friction bearings whenever the speed and application are suitable.

More Power, Bigger Tires For Scraper Unit

WOOLDRIDGE MFG. CO., Sunnyvale, Calif., has called attention to the more powerful 225-hp. engine and larger 24 x 25 24-ply low pressure tires that have been adopted as standard equipment for its new self-propelled scraper. Substantially increased speed, gradeability, traction, flotation, and load-carrying capacity are claimed. This announcement follows the introduction of other new features including formed steel construction, 65-in. apron opening and curved ejector



Self-propelled scraper unit has 225-hp. diesel engine

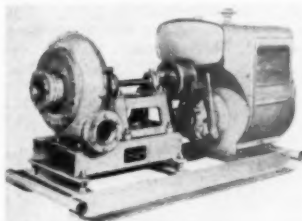
for faster discharge of sticky materials, and increased ground clearance.

The new machines are now in full production after successful job testing and the manufacturer advises that performance reports were carefully analyzed during an extended period in which pilot models were kept in continuous service in earthmoving operations.

New Portable Pump

KANSAS CITY HAY PRESS CO., Kansas City, Mo., has announced a new skid-mounted, engine-driven sand and gravel pump for use in quarries, strip or underground mines where removal of water-containing solids is necessary. The portable unit has a self-

priming device utilizing vacuum developed by the power unit. Its manufacturer says that minimum maintenance is required by the pump, V-belt drive, or power unit. Side plate liners and impeller are cast of a special hard metal for high resistance to abrasion. Design of the pump is such that re-



Sand and gravel pump

placement or checking of parts may be easily made. The pumps are in two sizes, 4 in. and 6 in. with power units of 30 and 77 hp. The 30-hp. unit is 4-cyl., air-cooled, and the 77 hp. is 6-cyl., radiator-cooled type.

Tungsten Carbide Insert Bit

O. J. BLACK, Bishop, Calif., has developed a tungsten carbide insert bit that has the tungsten carbide inserted on the regular drill steel. The drill steel is a special Swedish steel. The bit was primarily developed so as to drill hard ores more economically, such as the hard tungsten ores adjacent to the Bishop, Calif., area. These ores are for the most part garnetite—an amorphous form of garnet—and drilling costs with ordinary types of bits were excessive.

On drilling this type of ore with replaceable bits, failure of the shank was one of the principle cost items and



Tungsten carbide insert bit

this new steel and carbide insert was developed to correct the trouble. Manufacturer says this permits use of smaller steel and bits, making smaller holes and greater drilling speed.

NEW MACHINERY

"Gyra-Gnome" Secondary Gyrotory Crusher

LIPPMANN ENGINEERING WORKS, Milwaukee, Wis., has developed a new secondary gyrotory crusher known as the Gyra-Gnome. By applying new principles of construction, it is said that this crusher is lower in height and lighter in weight, yet comparable in capacity to other gyrotory crushers. Complete anti-friction operation with



Secondary gyrotory crusher

oil lubrication gives this crusher lower power consumption. Larger shafts permitting larger anti-friction bearings for longer service also reduce maintenance cost of this machine; the bearings are said to be many times stronger than those in ordinary crushers, the manufacturer claims. The Gyra-Gnome has easier adjustment because only 12 bolts need to be loosened to raise or lower the head and no springs need to be worked against. It is made in the following crushing chamber sizes: 25 in., 36 in., 51 in. and 72 in.

Wheel Mounted Swivel-Piler

STEPHENS-ADAMSON MFG. CO., Aurora, Ill., has introduced a new wheel mounted swivel-piler designed for ground level storage. It is very effective in handling granular or small lump materials, according to the manufacturer. Material is dropped on a short, high speed belt held in a concave path by an idler disc on each edge. Centrifugal force presses the material against the belt and it quickly attains belt speed before being thrown off in a steady stream.

Its designers say that it can handle up to 50 tons per hour, depending on the material. Angle of throw can be adjusted from 8 to 40 deg. by means of an operating lever, giving a pile height from 18 to 25 ft. Horizontal movement is obtained by cocking a small steering wheel and swiveling the whole unit about on its center axis. With a 5-hp. motor, unit weighs about 460 lb. It can also be equipped with

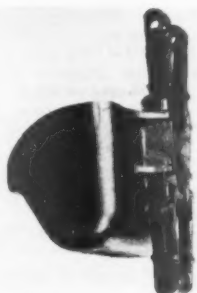


Swivel piler mounted on wheels

a gasoline engine, if desired. Floor space is 2 ft. 9 in. long and 3 ft. 4 in. wide, with a height of 4 ft. 1 in.

Uni-Cast Elevator Bucket

BEAUMONT BIRCH CO., Philadelphia, Penn., has developed a "Uni-Cast" bucket for improved elevator efficiency. Cast integrally with a single link of chain, Beaumont Beucalloy "Uni-Cast" buckets cannot loosen and fall off, the manufacturer says. They

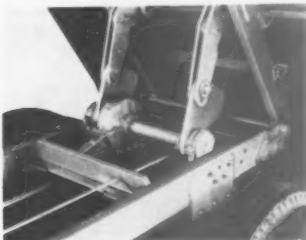


New-type elevator bucket

are easy to replace . . . costing no more than a bucket with single link of chain, the manufacturer advises. There are no raised surfaces or projecting bolt heads on inside of bucket to retard discharge of material. Made of Beucalloy, a heat-treated alloy steel, the bucket is said to be exceptionally durable. The front edge and corners are reinforced to withstand severe abrasive action while loading. The bottom of the bucket is flat to prevent arching. They are made in five sizes, 8 in. x 5 in., 10 in. x 6 in., 12 in. x 7 in., 14 in. x 7 in., and 16 in. x 8 in. Other sizes can be furnished to meet requirements.

Mechanical Hoist for Dump Truck

DETROIT MECHANICAL HOIST CORP., Detroit, Mich., has announced a new mechanical hoist which it claims eliminates both hydraulic valves and circulating systems. Power to lift the



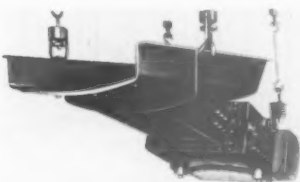
Mechanical hoist for dump truck

load is taken from the truck engine through conventional power take-off to a speed reducer and cone worm and gear set, the manufacturer advises. The cam and roller principle combined with lifting arm produces the power to dump the load. Known as the "Dube" mechanical hoist, the unit is said by its manufacturer to have been tested under conditions duplicating three years of normal usage.

Dust-Tight Vibratory Feeders

SYNTRON CO., Homer City, Penn., announces the addition to its standard line of heavy-duty "Vibra-Flow" vibratory feeders of a dust-tight model on which the working parts, the leaf springs, the armature, and the core are covered by gasket-sealed plates bolted to the magnet casting as illustrated.

By enclosing these parts, protection is obtained against clogging by excessive supply hopper spillage or



Dust-tight vibratory feeders

heavy dust conditions and makes the feeder suitable for use in otherwise inflammable locations.

The addition of this sealed protection does not affect the feed rate, which ranges up to hundreds of tons per hour of bulk, dry or damp, hot or cold, fine or coarse materials.

Variable Speed Transmission

WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J., announces a new variable speed transmission series, incorporating the Worthington tandem belt design.

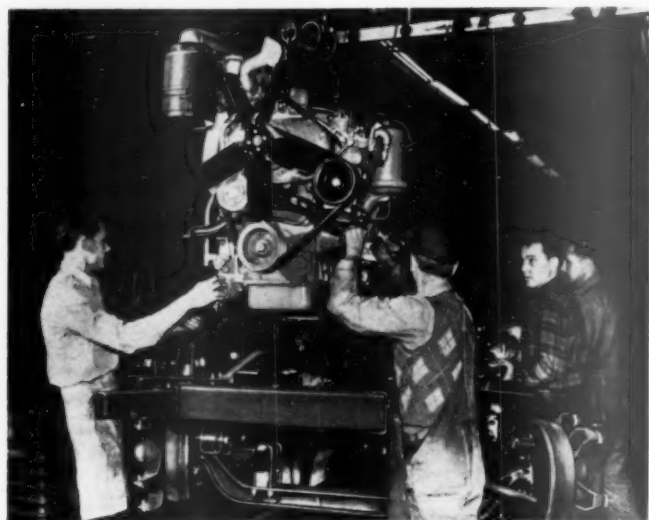
The new line, known as the Worthington Allspeed Drive, will consist of six models, rated at 1, 3, 5, 7½, 10 and 15 hp. respectively, and will offer



Variable speed transmission unit

variations of 16 to 1, 10 to 1, 9 to 1, 8 to 1, 6 to 1 and 6 to 1 respectively. At 1725 r.p.m. input, the 1 hp. unit offers a range of 215 to 3450 r.p.m.; while the 15-hp. unit will vary from 370 to 2220 r.p.m. with an input speed of 1750 r.p.m.

Due to the tandem belt design, the Worthington Allspeed drive is par-



General Motors Corp., Truck and Coach Div., Pontiac, Mich., has announced it is in full-scale production on the new GMC 640 and 650 diesel trucks. The photograph shows a four-cylinder diesel engine being lowered into a chassis as it goes down the assembly line. The engine was designed for the trucks which have gross combination weights of 45,000 and 55,000 lb.

ticularly suited to applications where space limitations require extreme compactness. Upon advance specification each of the units will be furnished for vertical or horizontal operation, to run in either direction.

New type self-cooling belts are provided, and when necessary belts can be readily changed without disconnecting the unit from other equipment. Rotary motion in the unit is carried in shielded ball bearings.

Perlite Expander

GENERAL PERLITE CO., San Jose, Calif., has announced that it will sell or lease its new patented perlite converter, which according to the company, uses the airflow method of processing, wherein the sized perlite ore is held in the flame while it travels the length of the converter during which time it is processed. The ore emerges into a transition stack from which it escapes into a large bin with baffle plates that automatically separate the various sizes into smaller bins leading to measuring chutes where the processed perlite is bagged. Operating principle of the converter is to keep the perlite ore in constant suspension in the flame in the conveyor and keeping it from touching the side walls and forming secretions.

The flow of processed perlite through the transition stack, which draws in atmospheric air, helps to cool it sufficiently so that it may be bagged immediately. Various regulating valves on the unit admit of control to process any perlite ore and baffle plates in the separating compartment effect automatic separation of sizes. The converter, measuring 24 in. outside diameter, is lined with special cast refractory with annular air rings of special metal with a number of apertures directing air force at predetermined angles and is slightly more than 15 ft. long, inclined at six deg. horizontally, mounted on a steel framework superstructure 16 to 18 ft. high, requiring a minimum of floor space.

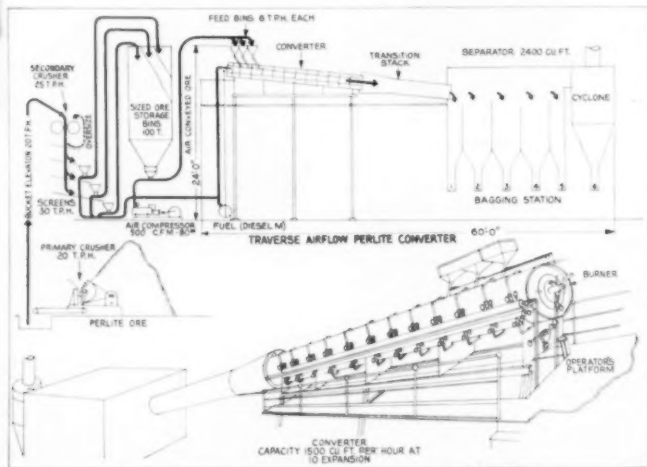


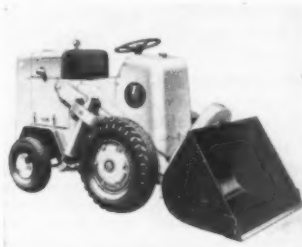
Diagram shows design and function of airflow perlite converter

NEW MACHINERY

Tractor Shovel

THE FRANK G. HOUGH CO., Libertyville, Ill., announces production of its new, improved Model HA "payload loader." This small, compact 12-cu. ft. tractor shovel has wide use in foundries, fertilizer plants and processing and manufacturing plants where bulk materials must be unloaded from box cars and materials must be moved inside and outside of buildings.

The new improved Model HA is a faster, more rugged and more powerful machine. A new higher com-

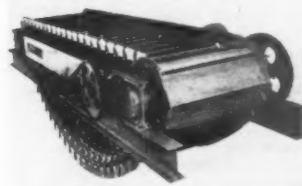


Tractor shovel

pression engine gives more power and economy; the clutch is larger; operator's compartment is roomier and more comfortable; steering gear and linkage are more rugged; main frame is stronger; a constantmesh transmission insures faster, quieter operation; maintenance operations are simplified by greater accessibility of engine and other parts, the manufacturer claims.

Manganese Apron Feeder

LIPPMAN ENGINEERING WORKS, Milwaukee, Wis., has added a new manganese apron feeder to its current line of heavy and super duty apron feeders. The apron width of this heavy service manganese feeder is 4 ft. and it is made in various lengths. The pans, rollers, sprockets and bushings are cast austenitic manganese steel. The frame is heavy structural beam style, welded and



Manganese steel apron feeder

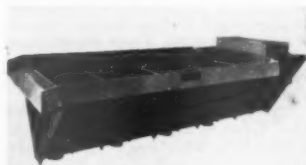
supported with cross structural members. All shafts turn on over-size anti-friction bearings and the cast manganese pans hinge together in an endless apron and are self-cleaning

and supported by ribbed members for the heaviest impact service. Pins are made of heat-treated alloy steel. Special high-capacity roller bearings are used on the end shafts to withstand tough service. The feeder can be operated optionally with either direct motor drive or from auxiliary equipment, with roller chain or belt.

Improved Sand Washers

EAGLE IRON WORKS, Des Moines, Iowa, has announced a new water scalping tank designed for use with Eagle fine material screw type washer-classifier-dehydrators. Made available to sand and gravel producers, they remove excess water and afford a consolidation or settling of the remaining solids content in water delivered to the weir screw unit. Each unit is designed with necessary area and length of weir to hold velocity of discharge water to a minimum, and adjustable weir lips are provided so that the length of the weir may be varied.

Adjustable gates are provided in the bottom of the tank for bleeding off



Design of water scalping tank

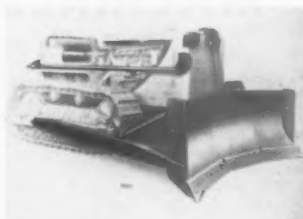
solids which have settled. Percentage of water in the bled solids averaging about 30 percent, this material can be flumed to the screw classifier where desired fines will be retained, washed, further classified, and dewatered to the degree desired.

U-Shaped Bulldozer

CATERPILLAR TRACTOR CO., Peoria, Ill., has developed a new, large capacity, U-shaped bulldozer, designed for universal use in a variety of earthmoving applications with the Caterpillar Diesel D8 track-type Tractor.

The new design permits long-haul pushing of loose material with minimum end spillage when bulldozing straight ahead. It is claimed to be an excellent tool for stockpiling, handling large capacity loads and allowing good maneuverability. The U-shaped bulldozer does smooth finishing, quick backfilling, and pioneering and side hill work.

Designated as the No. 8U, the new bulldozer is similar to the standard Caterpillar 8S Bulldozer except for the U-shaped blade which necessitates longer push arms. The complete unit



Diesel-powered U-shaped bulldozer

is cable-controlled and consists of blade, push arms, trunnions, cable, sheaves, and sheave brackets.

Cutting width of the blade is 11 ft., 11 in., and it is 45 1/4 in. high. Maximum lift above ground at the center point of the blade is 47 1/2 in., and 54 1/4 in. at the end points. The limit of blade pitch adjustment is 10 deg., and the maximum blade tilting adjustment is 16 in.

Waterproof Cement Block

STEVEN WILSON, Lakewood, Ohio, has filed a patent for "waterproof cement block and mortar" and says that successful tests were conducted by the J. H. Herron Co., engineers and chemists, Cleveland, Ohio, for absorption, capillary and compression results, with Federal Specifications SS-C-621 and Testing Materials Specification C-90 fully met. Wilson says the ingredients of his composition are in dry powdered form comparable to flour and when embodied into the mass of sand, cement, lime, cinders and slag materials, acts as its own carrier, thus creating and spreading a thin diffusing film of elasticity, interweaving and interlining all voids and channels, thereby bringing into being its own characteristics in strength, lessening the chance of expansion or cracking of mortar joints, concrete blocks and the like and be impervious against the elements in waterproofing, mortar, concrete and slag building blocks.

New Truck Line

FORD MOTOR CO., Detroit, Mich., recently introduced new Ford trucks for 1951, including more than 180 models designed to reduce operating costs, make trucks adaptable to more jobs and to add driver convenience and comfort.

The trucks feature automatic power pilot carburetion-ignition control on all engines. This system is to provide power with economy by metering and firing the correct amount of fuel at the right instant under varying loads without spark knock. The cab and front end have been restyled to give a more rugged and smarter appearance.

MACHINERY DEVELOPMENT OF 1950

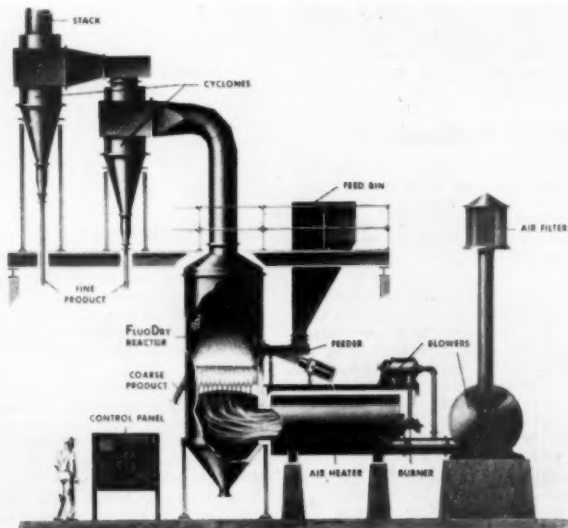
DURING THE PAST YEAR many new and novel pieces of equipment went into service and we are herewith presenting a few of these because of their usefulness and novelty in the rock products industries.

The Schonrock Equipment Manufacturing Co., San Angelo, Texas, is marketing a cable-dump trailer that appears to have many advantages. The tractor carries the winch and dumping mechanism and the assembly is so designed that the trailer can be dumped at any angle (with respect to the long axis of the tractor.)

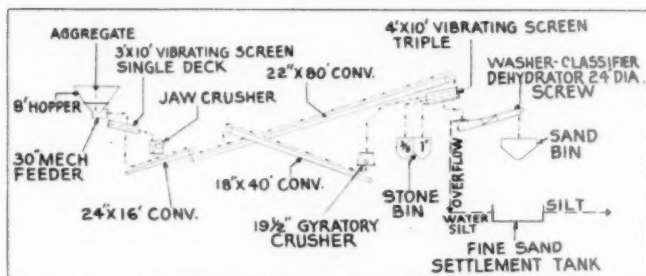
Calcination

The Dorr Company, Stamford, Conn., has applied the principals of Fluo-Solids calcination as described in the January, 1948, issue of *Rock Products*, to drying and sizing by fluidization.

At New England Lime Co.'s Canaan, Conn., plant, dolomite, obtained by a quarrying operation, is calcined in two rotary kilns. The resultant variable moisture conditions and high dust loss were a considerable hindrance to efficient kiln operation. After extensive laboratory and pilot plant testing, a full scale Dorco Fluo-Dry System was installed to correct these conditions. The first commercial installation, this unit is successfully producing a dry sized feed for the kilns, removing 89 percent of the 200-mesh fines and 60, 79 and 85 percent of the minus 65, minus 100, minus 150-mesh fines respectively.



Fluo-Dry system for moisture control to produce a dry sized feed for the kilns



Flow diagram of crushing and screening plant (Cooke & Co.)

Portable Plants

In the semi-portable field plants of relatively small capacity are finding increasing usefulness. A plant of this type which might be used to illustrate the trend towards strategically located small plants could be the sand and gravel plant of Cooke & Co., Inc., Scarborough, Maine.

The separation of aggregate into stone of two sizes namely, pea stone and buck wheat—and washed silt-free sand, is the principal operation of this company. Since last August, it has been operating a new screening and crushing plant, designed and installed by Austin-Western Co.

Eight hundred cu. yd. of aggregate per day is fed into this unit which produces 250 cu. yd. of pea stone (1 in. dia. size) and 150 cu. yd. of buck wheat (3/4 in. size) per hr. The balance is washed sand.

The plant which is fed by a Lima 1 1/2 cu. yd. crane with clamshell is a completely self-contained unit. Water for sprays is supplied by a Twin Coach pumping unit capable of delivering 500 g.p.m. from a nearby small body of water.

As seen from the accompanying flow sheet, the aggregate is fed into the plant through a 3- x 10-ft. single-deck screen. Oversize stone is crushed by an Austin-Western Jaw Crusher (Series 1024) and reintroduced into the process. Next, a triple-deck Seco screen, size 4 x 10 ft., separates oversize, which is crushed by a Kennedy (19 1/2) gyratory crusher, into pea stone and buck wheat sizes, which go into a two-compartment hopper for loading. Sand is washed in a double-screw, fine material washer-classifier-dehydrator, and fed into a hopper for truck hauling.

Overflow from the washer carries silt which is discarded at the end of the pipe line, and fine sand which is trapped at some distance from the washer.

This new plant is designed for operation by only one man. At present,

MACHINERY DEVELOPMENTS

Cooke & Co. still keeps a second operator on hand for emergencies. A. C. Stanley, president of the company, stated:

"The new plant actually has a capacity of 150 t.p.h., which is more than we can utilize at present. Compared with our previous washing and screening operation, this plant saves us two trucks . . . at \$30 per day, each . . . and four men . . . at \$8 per day, each. So, we save a total of \$92 daily, or almost \$14,000 per year, since we work 6 months out of each year and 25 days per month. At this rate, the plant will pay for itself in less than five years.

"The savings in man-hours and trucks do not take into consideration the fact that we have tripled our production, since this plant was put into operation. So, we are actually producing three times as much as before, at less than half the cost. Our maintenance cost on this equipment has been extremely small.

"The quality of the gravel and sand produced has been very satisfactory. And clean, carefully washed material is important when one wants to obtain concrete that does not deteriorate."

Another illustration of the semi-portable type of plant is that of the Juniata Limestone Co., Mifflintown, Penn. The plant took full advantage of the terrain, and at the same time got the primary and secondary crushers close together. The plant uses Pioneer equipment and the main units are a 2436 jaw crusher, a 40- x 22-in. triple-roll crusher, two 4- x 12-ft. vibrating screens of which one is a triple-deck unit and the other double-deck. The belts are 24-in. and the three steel bins each holds 21 cu. yd.

Drills

The Joy Manufacturing Co., Pittsburgh, Penn., developed during the past year its Champion blast hole drill which is a rotary type drill, but instead of using water to remove the cuttings this machine uses air blasts.



Diesel-driven blast hole drill



A semi-portable plant takes advantage of terrain with primary and secondary crushers mounted near each other

Some performance data on the unit follows:

In a dense, hard dolomite quarry in Michigan churn drills averaged 1½ ft. per hour drilling a 6¼-in. hole. The rotary drilled 20 ft. per hour. In a medium hard limestone, churn drills made 8 ft. per hour and the rotary 38 ft. in the same time.

Cableways

Sauerman Bros., Inc., Chicago, Ill., is supplying users of slack-line cableways with tubular steel masts which are replacing the timber masts formerly used. The masts are easier to erect and are shipped in two parts with bolted assemblies. A steel ladderway to a platform at the top of the mast are also a part of the unit.

Desilter

Shown in the photograph is a Dorrco bowl desilter in operation at G. & W. H. Corson, Inc., near Philadelphia, Penn. The desilter combines big set-

ling area and relatively fine solids from large quantities of water. In this installation, saleable agstone is being produced from a stone washing operation but the machine is applicable to sand or any other fine solids recovery. At the Corson plant a 26 ft. dia. bowl is coupled with a duplex classifier 5 ft. wide x 30 ft. 4 in. long. Feed averages 600 g.p.m. containing 3-4 percent solids of which 95 percent is minus 100-mesh material and approximately 50 percent is minus 325-mesh. Eighty-eight percent of the plus 325-mesh material is recovered as a rake product containing 25 percent moisture. Average overall recovery is 55 to 60 percent, amounting to 3 to 4 tons per hour.

These two pages cover some of the new developments in machinery and plants of particular interest, which were called to the attention of the editors in answer to a letter questionnaire.



Bowl desilter recovers agstone from washing plant overflow



Halliburton's new mill at Corpus Christi, Texas, has helped solve the supply situation in one of the highest demand areas in the nation (see **ROCK PRODUCTS**, August, 1950, issue)

CEMENT INDUSTRY'S EXPANSION PROGRAM SUMMARIZED

Presidents of cement companies comment on supply situation and enumerate capacity increases accomplished; demand for cement likely to be slightly lower in 1951 due to predicted lower construction

By **BROR NORDBERG**

IN LOOKING BACK over events of 1950, the available supply of portland cement was the one thing of greatest concern to the cement-consuming industries and to the portland cement industry itself. As we entered the winter season, stocks of cement at the mills were at a dangerously low level and, for the year, the largest volume of cement had been shipped in history. The figure for 1950 will be between 220 and 225 million barrels.

Ready-mixed concrete producers, concrete masonry unit manufacturers and other consumers including contractors, builders and political subdivisions had been complaining throughout the year that their activities had been seriously curtailed for lack of cement. Those who have been complaining of discrimination by the portland cement industry in the allocation of cement, gray markets and poor service are entering the new year with misgiving and very considerable pessimism as to the outlook for the coming year because they anticipate little or no improvement in the supply of cement to be available.

The ready-mixed concrete industry, which likely represents the most important purchasing segment, and

which used between 35 and 40 million barrels of cement in 1950, was hard hit by shortages of cement and has gone on record with the cement industry that remedial measures should be taken.

In that industry, there had been curtailment and actual stoppage of operations in some areas for lack of cement. Otherwise, 1950 would have been the greatest production year by far in the history of the industry. The ready-mixed concrete industry, because it takes some 18 percent of the production of cement and because it has contributed greatly to the movement of cement throughout the winter months, believes that those facts should be given careful consideration in the establishment of distribution practices. The industry has expressed its desire to enter into signed agreements for its cement supply such as are negotiated by some cement companies with highway-builders.

Similarly, other consuming industries have expressed themselves as un-

satisfied with supply of cement made available and the manner of distribution.

Shortages

Instances have been reported in some localities where cement was bringing as much as three times the normal price on the gray market. For example, as recently as November 1950, it was reported that prices ran as high as \$2.25 a sack for cement in Dallas, Texas, where the price would have been 70-85 cents, depending upon quantity, when sold through legitimate dealers. Cement is even being stolen from building sites, according to newspaper reports.

There are also reports of imports of cement from Europe into eastern seaboard markets. In Richmond, Va., for instance, cement from England and Germany was being purchased by concrete products concerns at prices from 50 to 100 percent more than that prevailing for domestic cement. There has been no evidence of the use of imported cement in heavy construction. According to the local newspaper in Richmond, the federal government pre-empted the production from the cement mill which normally supplied

most of the market.

According to a survey conducted by *Engineering News-Record*, (November 23, 1950, issue) half of 69 cement centers surveyed indicated cement shortages. Most reports of shortages came from areas east of the Mississippi river and, in general, the shortages have been local or regional in character. In August, alone, 110,000 bbl. of hydraulic cement were imported which contrasts with the total for all of 1949.

While buyers of cement have had their difficulties, the portland cement industry, as a result, has had trying times in attempting to satisfy its various classifications of purchasers. It can be said that the majority of cement manufacturers have given the problem of proper allocation top priority. And they have very plausible explanations, much beyond their control, for failure to deliver cement to all purchasers in desired amounts. They have expanded production more than is commonly realized, and at considerable risk when it is recalled that the industry until recent years never had enjoyed anything like capacity production before in modern times.

Industry Capacity

The criticism that the industry has been lax in taking steps to increase production commensurate with growth of the nation is not correct, as will be shown later herein, in the presentation of facts and figures on

national growth in productive capacity and in detailing specific installations made at great capital investment. Whereas it is true that estimates of construction for the year 1950 turned out to be far too low, the fact remains that the industry has a capacity of 250 million barrels of cement annually. Thus, there was a potential of 30 million barrels over and above actual shipments for the year. Strikes, shortages of railroad cars and the inability to produce to capacity during the winter months because shipments as a rule do not keep pace and storage in silos cannot exceed practical limits were important factors.

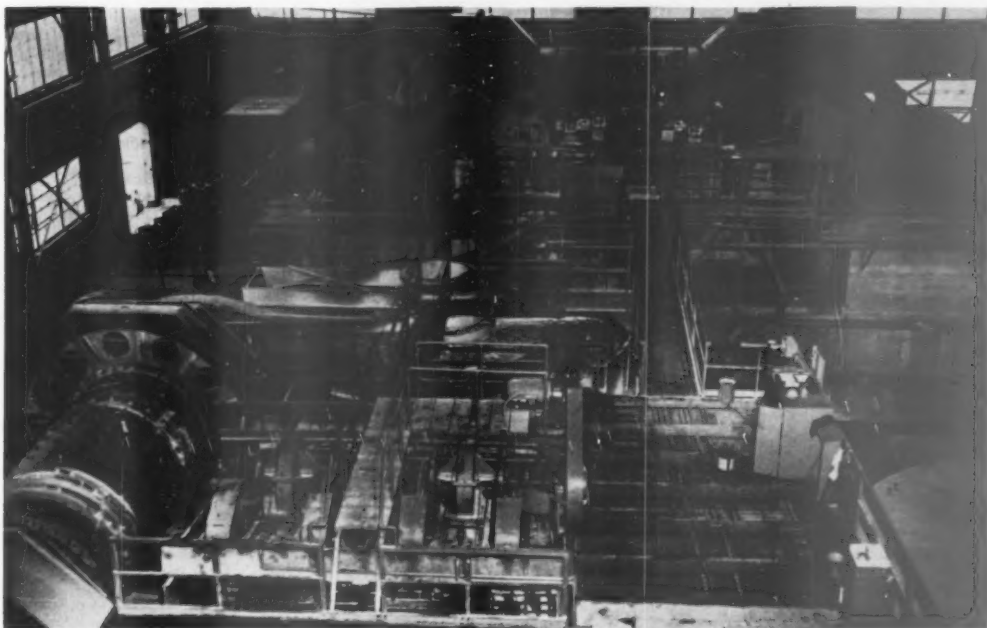
The question foremost now is the outlook for the years ahead. In an endeavor to develop specific information of value to consumers of cement, and to the manufacturers of cement, the editors asked the top executives of cement companies to comment on the supply situation and prospects for the year ahead. They were further requested to detail what has been done to increase production capacity during the past several years, in order to divulge what may be anticipated by consumers in increased capacity and where the increases have been made geographically. Response to our letter reflected great interest in the subject and is representative of 85 percent of total national production of portland cement. Our appreciation is hereby expressed to officials of cement com-

panies for their generous replies and informative letters.

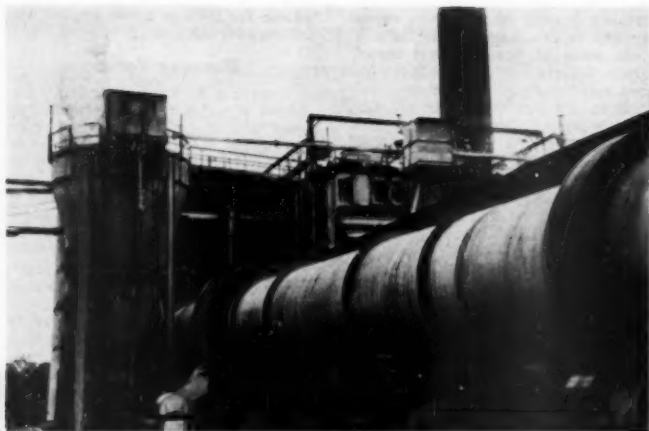
Shortage Factors

According to some manufacturers, the margin of shortage of cement was small in 1950 and the principal problem has not been production but one of getting cement to the user when he wants it. They maintain that the shortage would have been negligible if shipments could have been made evenly over 12 months in 1950. Strikes of from one to three months' duration were a serious obstacle. One large manufacturer, for example, reported a loss of 4 percent in shipments due to strikes which, it was believed, made the difference, it being emphasized that shortages, even though slight, are considered as severe as big shortages because there is no measure of degree.

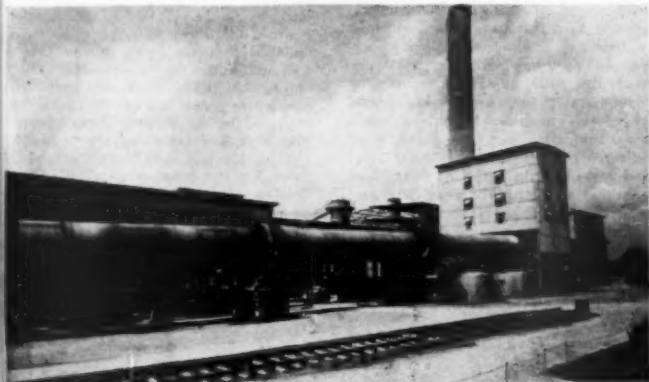
Several manufacturers wish to point out that the industry never approached capacity prior to 1946 and made little profits or actually lost money for many years; yet, has expanded more than proportionate growth of the nation because it is believed that the low's of the 1930's will not again be experienced. They emphasize, also, that demands for cement as great as in 1950 are not expected in the future. Others maintain that the extent of shortages do not justify additional capital investment for increased production. High freight rates and unwillingness by purchasers to pay higher freight charges from alternate sources of sup-



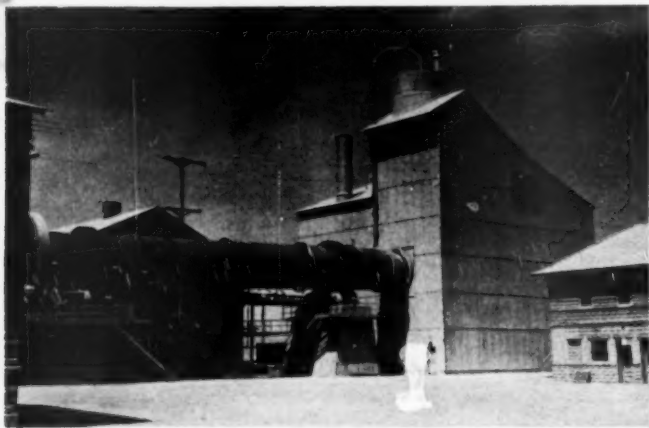
In the left background is seen a preliminary raw mill. The mill in foreground is close-circuited with bowl rake classifier. Mill in the right background is used normally to grind clay, bauxite and iron ore screenings in open circuit in new postwar plant



The airlift, for regulated feed of raw material into rotary kilns, is now being installed in several dry process plants



This 300-ft. kiln has the distinction of having a turning rate that is among the fastest in the industry. It turns in excess of 100 r.p.m. Recently, there are cases where new kilns are being turned at less than 1 r.p.m., but the average, for stepped-up production, has settled on about 75 r.p.m.



A modern 11- x 230-ft. rotary kiln with waste heat boiler in a midwestern cement mill was selected as to size for combining maximum kiln efficiency with peak desired waste heat recovery

ply (f.o.b. mill plus freight) were blamed for some "apparent" shortages as reported. In one case, a manufacturer questioned why an entire industry should be criticized because, freightwise, the industry was powerless to clear up the situation. Another manufacturer has held off expansion while waiting definite clarification of the F.T.C. ruling against basing point pricing and has now decided to go ahead with a long-delayed expansion program.

An eastern manufacturer stressed that the cement industry has had a history of prompt deliveries and, therefore, delays in deliveries have been unduly stressed in criticisms.

As to the future, an increase in productive capacity of some 10 million barrels for the industry is expected for 1951, over 1950, which it is believed will help immensely. In California, expansion has brought capacity already to a point definitely in excess of shipments (1950). Direct quotations from some of the more informative letters were as follows:

A California manufacturer: "I am aware of the criticism directed at various industries because of alleged or temporary shortages and I have no doubt that some of these criticisms are justified. On the other hand, I consider it inappropriate to damn an entire industry because of some minor local shortage which the industry as a whole is powerless, freightwise, to correct."

A midwestern manufacturer: "In this area, we lost 500,000 bbl. of production in mid-season due to strikes which should not recur next year. This lost production, coupled with some additional capacity should insure enough cement for the users in this area in 1951. In my opinion, there would have been nothing worse than spot shortages this year had it not been for the production lost due to strikes."

A southern manufacturer: "We are conscious of the situation you describe in cement supply. Our mill has been extensively overhauled in recent years beginning even a little before the end of the war and has been producing its full capacity very consistently, but something more is needed. We have held back because of doubt how the Federal Trade Commission position on cement prices might affect our marketing area when cement supply again exceeds demand.

"Now, however, we have decided to take the chance that there will be a sensible solution of this and have picked up again a plan for increased production that we laid aside several years ago. This will give us a 20 percent increase effective in 1951 (we hope about mid-year, depending on receipt of materials). Later this will become a total increase of 50 percent but we must wait for a lull in business to realize this because it will require shutdowns that we cannot afford under present conditions."

From the Lehigh Valley: "Your let-

ter citing criticisms of the cement industry voiced by cement users is not surprising. This industry has a long history of making prompt shipment and rapid deliveries. Under normal conditions orders received up to mid-afternoon are shipped that same day. There are many instances of cement shipments being received as quickly as express packages.

"With cement buyers accustomed to this kind of service, it is not strange that they become critical when demand causes shipping delays of a few days. Even under 1950 conditions, have any of the major building materials been delivered prompter than has cement? One of the factors which has contributed to the present heavy demand for cement has been its low price. Since 1939 lumber prices have advanced some 300 percent, steel prices 78 percent, but cement prices have advanced only 48 percent.

"Regarding forecasts for 1951, with the many uncertainties causing confusion today, there is no forecast which might be of value. Restrictions and controls already in effect or contemplated will have an effect on the construction program next year. Reports out of Washington, as well as those issued by F. W. Dodge Co., indicated from 15 percent to 19 percent reduction in demand for the year. Many conditions might arise to cause immediate changes, but, with the increased capacity in the cement industry, we feel that it is reasonable to assume that cement will be in reasonably ample supply to take care of construction needs in 1951."

Says Price Too Low

A small southern manufacturer: "If I personally had the money to build a brand new cement mill, I would not put my money to that use. I say this because I have always felt that the price of a barrel of cement is too small, as compared with the cost



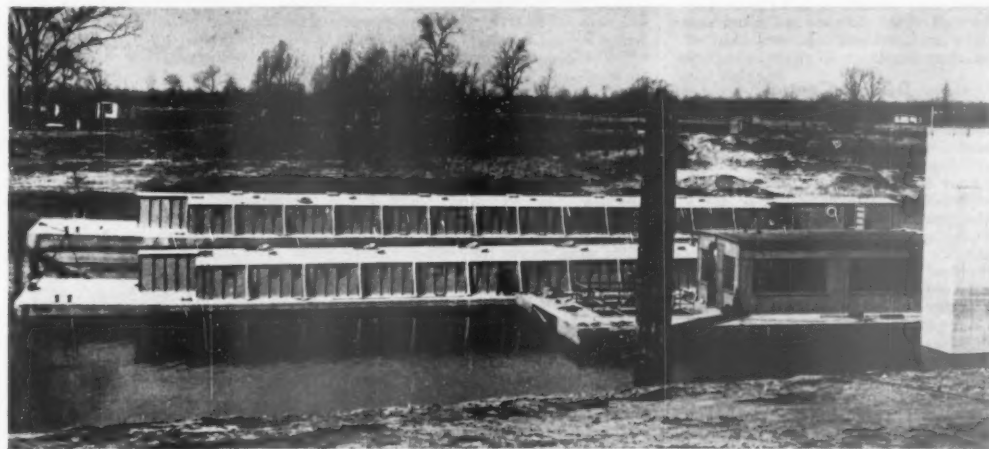
A modern panel board for controlling the firing of a postwar long rotary kiln has instruments governing every conceivable phase of burning clinker. The trend is toward more automatic features in regulated firing.

of making a barrel of cement. Very few companies in this industry have been able to build up to large corporations from small corporations. The rest of us have had to struggle and plow back into our present plants what little we have been able to earn."

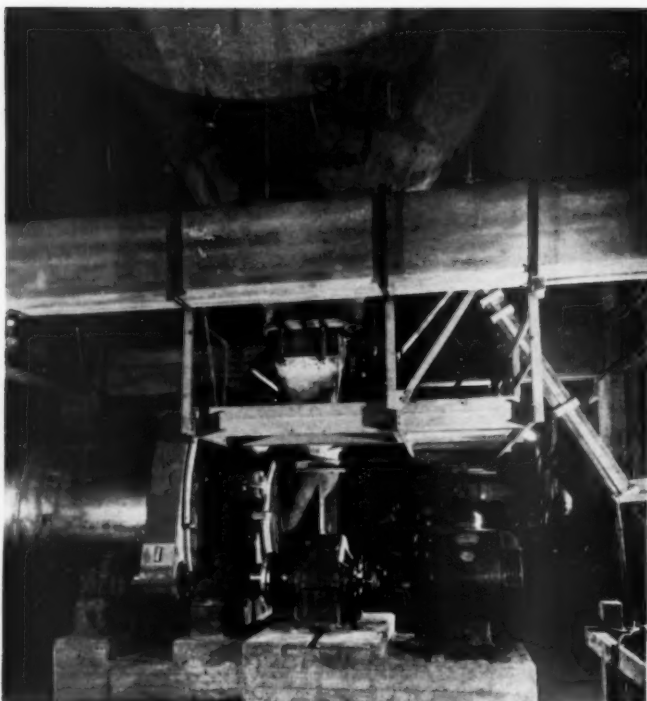
A large western manufacturer with several plants: "Demand for cement during the year 1950 has exceeded our expectations. All of our plants have operated at full capacity during the year. The results of the expansion and rehabilitation program that the company has had under way for the past three or four years became fully apparent as the year wore on, and production for this year, 1950, is approximately 10 percent greater than

for the year 1949, and 97 percent greater than for the year 1946, the last full year prior to the start of our expansion program.

"The uncertain military situation leaves the question of cement demand for the year 1951 very much in doubt. Already house construction has been curtailed. Conceivably, private construction of all kinds could be reduced sharply. Very likely, in such event, a military program would develop in the way of new and longer airport runways, paving of certain access roads and other types of defense and war production projects which would require considerable quantities of cement. As to just how the cessation of private activity and the institution of the military program



Self-unloading barges at a Memphis, Tenn., distribution plant. Effective use of waterways is one way to reduce transportation costs.



In recent years there have been installations of several direct-firing tube mills in connection with rotary kilns, of which this Canadian plant installation is an example

might correlate, nobody can tell, but it is almost a certainty that cement requirements for the year 1951 will be somewhat less than for the year just closing.

"Under normal conditions we would expect the demand for cement to continue and increase, as many new markets for this most adaptable of all building material have been developed, and cement is finding its way into all of the old uses and many new ones as the knowledge and skill of builders develop."

Decries Control

An eastern manufacturer in commentary on the supply situation, presented the following letter addressed on September 20, to a customer: "Your letter was interesting to me, especially as you appeared to carry the prevalent idea that the United States government is the cure-all for the ills of the nation as well as individual situations. For one, I deprecate the idea of government control, and the calling on the government for things that should be done by state and local agencies.

"With reference to your statement that the cement industry has failed to measure up to its obligations as shown by the growth in population, I have compiled some information in this regard which may be interesting to you as follows:

"Population:

1920—106,500,000
1930—123,100,000
1940—132,000,000
1949—149,200,000

"Cement industry shipments (bbl.):

1920—100,123,245
1930—161,197,228
1940—129,830,687
1949—209,831,000

"During the four years 1932-1935 inclusive the largest yearly shipments were in 1934, 77,747,765 bbl., which completely covered the entire needs of the country, and was very greatly less than the capacity of the industry. You will note that shipments during the year 1949 were more than double those in 1920, whereas the population during that same period of time increased less than 50 percent.

"At the present time there is a shortage of cement in many sections of the country, but the section that we normally supply is shorter than usual this year, because the workers in two cement plants have been on strike for some time, and we do not know when they will go back to work. Our own plant can hardly be expected to pick up the pressure that has developed because of the shortage caused by these unnecessary shutdowns, but you might be interested in the fact that we shipped over one million barrels of cement more in 1949 than we did in

1921, the first year our plant was in operation. This indicates to some extent what we have been doing to supply the needs of builders.

"Regretting that you have not been able to get all the cement you need this year, but reminding you that the construction industry in 1950 is about at its peak, and many contractors have been unable to find sufficient workmen to carry on their work, we remain . . ."

A lengthy letter from one of the nation's large multiple-plant manufacturers: "A certain amount of criticism is inevitable during times when the demand for any product exceeds the supply. It was only during the last half of this year that the demand was not fully met, but under these circumstances no one can say with accuracy by how much the demand exceeded the available supply. In our opinion, the margin was small.

"The principal difficulty experienced by the cement industry during years of high demand has not been one of inadequate productive capacity. Rather the problem is one of logistics, i.e., getting the cement to the user at the time he needs it.

Forecast Short

"For instance, at two of our plants our production during the early part of this year was limited because all storage was full and also the demand had not developed and there was then no reasonable indication that it would develop to the extent it did. Nevertheless, we continued limited production at these two plants and accumulated in storage a supply of cement commensurate with the indicated demand. At our other plants we operated at full capacity during the entire year, although at times in the early part of 1950, we felt that we were taking quite a chance.

"It should be borne in mind that the construction market exceeded everyone's expectation. The Department of Commerce's forecast for new construction in 1950, made just before the year's beginning, was \$19¼ billion. It will be more than \$27 billion, or more than 42 percent over the studied estimate of experienced observers. The Bureau of National Affairs estimated new construction expenditures in 1950 would total only \$18.8 billion. F. W. Dodge Corp. estimated that 1950 dollar volume of construction in the 37 states east of the Rocky Mountains would be less than \$10 billion, whereas the total will be over \$14.5 billion (with two months estimated) or an average of more than 48 percent.

"Had the Korean conflict not developed it is likely that earlier forecasts would have been more in keeping with reality. However, it did develop and owners and builders, remembering the construction restrictions during World War II, rushed into the market with projects which otherwise would have materialized in more leisurely fashion. So what hap-

pened was that everybody wanted cement between June and November.

"Each of our plants can pack and ship only a certain quantity of cement each day, and on days when railroad cars are not available, and there were many of them, shipments suffer and customers are disappointed. There is no doubt in my mind that had it been possible for the cement industry to ship more evenly over a twelve month period in 1950, the shortage, if apparent at all, would have been negligible.

"Another factor of importance this year was that during the summer a number of plants, particularly in the eastern section of the country, were shut down by strikes. Most of them were down nearly a month and one of them nearly three months. The loss of production and of course shipments was substantial.

"Statisticians estimate that the cement industry will ship in 1950 around 220 million bbl. of cement which will be the largest year in history. This compares with 206 million barrels in 1949 and 204 million barrels in 1948. Productive capacity however is 250 million barrels and the industry had on hand nearly 20 million barrels of finished cement and clinker at the beginning of 1950. Therefore it is obvious that the problem is one of distribution and not one of total production.

"In my letter to you of June 17, 1949, I said in part:

While there are some localities where additional production apparently could be utilized, we do not believe new plants will be built on an extensive scale for the following reasons:

1. The present over-all productive capacity of the cement industry is sufficient to take



A comparatively recent development in the use of refractories is the application of castable types. Shown here is the application of abrasion-resisting castable in a kiln section

care of the foreseeable demand in any normal year.

2. Increased interest and amortization charges on present high costs of plant construction would require considerably higher selling prices than at present to pay out satisfactorily.
3. Ideal plant location is in proximity to satisfactory raw materials and substantial markets. Most of such known locations are already occupied.

"That is still my opinion.

"The U. S. Department of Commerce is now estimating that con-

struction in 1951 will be 15 percent under that in 1950. F. W. Dodge estimates a reduction for 1951 under 1950 of 19 percent in the 37 eastern states. In the absence of much more stringent restrictions than exist at present, I believe that cement shipments for our industry in 1951 should be about 90 percent of those in 1950, or in the neighborhood of 200 million barrels. In this event, the overall productive capacity in 1951 will be 25 percent over the demand. Once again it should be emphasized that if the largest part of the demand is prevalent within a 6-month period, the user of cement may, at certain times, again find it in a short supply.

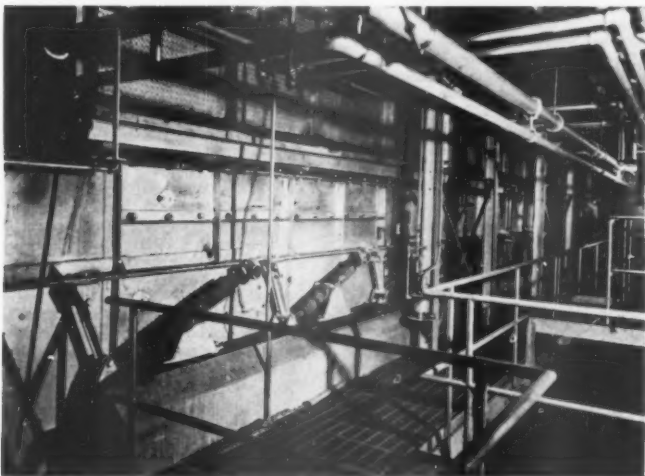
"In view of these facts, there seems to be little point in summarizing new plant construction or expansion of existing plants. It is sufficient to say that there have been and will be some of both regardless of the fact that productive capacity is in excess of normal demand.

"Not all comments by our customers have been critical. We have received a sufficient number of compliments to cause us to believe that we have done an excellent job in the face of difficult conditions."

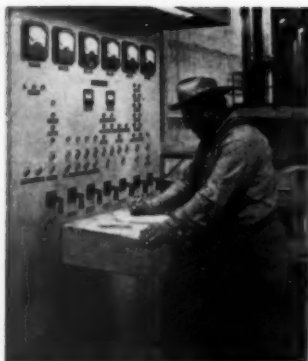
An eastern manufacturer: "We have had a very busy year and were fortunate not to have had a strike, as did many of the companies in the east particularly. That fact, however, increased the pressures on us for supplying cement and it was a very difficult season. We exceeded any previous record we made in manufacturing cement and, thereby, were able to be of some help in those strenuous times.

See Curtailed Demand

"We have not tried to make a very close guess on the prospects for 1951.



Clinker coolers of the air-quenching type are now universally accepted as standard practice throughout the cement industry. They lend themselves well to heat recuperation and controlled firing through instrumentation



This electrical control panel is an example of a trend in the cement industry toward the use of centralized boards from which the equipment throughout kiln operating department is regulated for bettered efficiency

We do not as yet know the public works program for the territory in which we ship our product. The elections usually have some effect on it and they are just over and the legislatures are not as yet in session, so we do not know what the appropriations will be. I believe it is generally understood that housing construction will be curtailed and that we may suffer other curtailment not directly connected with the defense effort. That makes a pretty difficult forecast problem. I recently heard an estimate that there would be 10,000,000 barrels more capacity in 1951 than in 1950, and if that is correct I doubt if there will be any shortage of cement in 1951. There, of course, may be greater demand in some area than is available from normal supply points, but by shipping from other territories I believe they would be supplied."

Effect of Strike

A large eastern manufacturer commented on the influence of strikes as follows: "In 1947 we produced at the rate of 80 percent of capacity; in 1948, 85 percent; in 1949, 87 percent; and this year we may reach 90 percent. About 3½ percent of our capacity was lost in the early part of the year when several of our plants had to shut down for stock adjustment. We are now planning some additional cement storage capacity to relieve this situation in the future, but it would be far better if we could promote more construction work during the winter months. I believe the rapid gain in use of concrete has been somewhat helpful in this respect.

"We lost 4 percent of capacity when five of our plants went out on strike for approximately one month last summer. Had these two factors not interfered with our production we would have used an additional 7½ percent of our capacity and thus made 8 percent more cement than we

did. I doubt if the excess demand for cement was any greater than that over the country as a whole.

"Perhaps we should make up our minds to increase our production facilities and be satisfied with a lower rate of operation. However, we will have to have a better price for our product in order to justify such expenditure."

A single-mill company in the east: "This will acknowledge your letter of November 22nd concerning the criticism that has been directed at the cement industry over the past six months.

"These people, who are so strong in their criticism of what the cement producers have done, have no doubt entirely forgotten what happened all through the 30's and early 40's when the cement companies as a whole used a very small part of their capacity, but the cement companies have not forgotten this. Our plant was put in operation in 1929 and never ran anywhere near capacity until 1946. We have had good years during 1947, 1948, 1949 and 1950.

"All during those other years we made very little and most years lost money as did most cement companies. However, in the face of all this we have continued to make improvements to our plant both to keep up its physical aspects and to increase our production. Last year we installed a new finish mill which gave us around 250,000 bbl. additional capacity and we are contemplating another mill next year which will give us about the same amount of increase.

"We do not expect to ever reach as low a level as we did during the 30's and early 40's but we certainly don't expect the unprecedented demand of this year to continue indefinitely."

A manufacturer in the Pacific Northwest: "It is true that at various times there has been lack of adequate cement in this area, but an analysis of the amount of cement actually short, based on final consumption figures, indicates that the shortage is not of sufficient volume or constant

enough at present to warrant or support the large capital investment necessary for a large substantial increase in cement production at the present time."

Distribution Factor

A manufacturer in the Rocky Mountain area: "So far as we know, there has been little, if any, actual shortage in our territory. The principal complaint seems to be because cement must be shipped in from other mills with considerably higher freight. The concrete products people are enjoying an unprecedented volume of business due to the continued activity in a building program, which business is forced upon them, I think, to a very great extent by the high price of lumber. This business developed very rapidly with us. We had no idea and no one else could foresee that it would continue, therefore, our present building program was delayed."

The situation with respect to supply and to allocation, with particular reference to the ready-mixed concrete industry, was covered by Marquette Cement Manufacturing Co. in a letter dated November 22, 1950, to the National Ready Mixed Concrete Association. The letter was, in part, as follows: "Let us begin by reciting that our principal markets are in Illinois, Minnesota, Nebraska, Arkansas, Indiana, Mississippi, North Carolina and South Carolina.

"The combined area is served by our four selling companies, Marquette, Cumberland, Hawkeye, and Hermitage.

"Now let us look at the combined record of our companies. Here are the facts for the first nine months of 1950, compared with those for a similar period in 1949.

"First, our total shipments for this period are 3 percent less than 1949. The principal reason for this is loss of production caused by the coal strike in February and March. But shipments to ready-mixed concrete plants in 1950 represent 40.8 percent of our total shipments. For the same period in 1949 this figure was only 29.9 percent. Stated another way, we increased this year's shipments to ready-mixed concrete plants 32.4 percent over 1949 notwithstanding a decline of 3 percent in total shipments. We believe these figures show that we, as one company are keeping abreast of the growth in the important ready-mixed concrete industry.

"It is, we believe, unnecessary to remind you that we have always considered the industry potentially important, even from its beginning, and that we have helped in many ways in its development through the years. The weight of this statement may be better understood by relating the estimated 40 million barrel consumption of the ready-mixed industry to the total of approximately 220 million barrels the cement industry will ship this year and then comparing the percentage so obtained with our own. Ac-



Almost universal practice today is the use of storage buildings like this with overhead cranes which handle all the raw materials and clinker into the grinding mill feed bins adjoining

cording to these figures the entire ready-mixed concrete industry requires 18 percent of the cement industry's shipments whereas our ready-mixed customers have gotten 40.8 percent of our total shipments.

"Of course, during this extraordinary year 1950, no ready-mixed concrete plant has gotten all the cement it could process, not even those who bought from us. But certainly no one believes today that the unusual combination of circumstances and conditions which brought about this tremendous total demand will continue throughout years to come, even throughout next year. It may well be, in fact, we are quite sure, that the use of ready-mixed concrete will continue to grow in relation to the total of all concrete made. However, that kind of growth can be met by the concomitant decline in shipments to the users of other methods.

"The problem really boils down to the question of whether cement producing capacity is sufficient for the demand in the years to come. Obviously, that was not the case in 1950, even after allowances for avoidable production losses. But will that be the case in 1951 and in future years? We are inclined to doubt it. Nevertheless, there will be considerably more cement available in 1951. Many additions to producing capacity are in the process of being made. Some of these additions will be in operation by early 1951 and the remainder will come into being before its close. Our guess is that at least 10 million barrels of capacity is in the process of development at this time.

"Our company has lately joined the ranks of those who are adding capacity. We are building to produce an additional 1½ million barrels, an increase of 18 percent over our present output. One-third of this increase will be available for the full year 1951 and the remainder will come into being in September.

"We believe the cement industry should do all in its power to advance the interests of the ready-mixed concrete industry. By and large we believe it is doing so. You know, of course, that from the viewpoint of improvement in the quality of concrete, this is the attitude of the industry's engineering organization, the Portland Cement Association. For our own part, we know it is the case."

Another manufacturer in the midwest wrote the National Ready Mixed Concrete Association, in part, as follows:

"During the first ten months of 1949 our company furnished a total of 414,836 bbl. of cement; and for the first ten months of 1950, 595,704 bbl. of cement to ready-mixed concrete companies. These figures indicate an increase of 43 percent during the first ten months of 1950 in our shipments to ready-mixed concrete companies. Our records show that for the same



Airslides are being adapted to many applications. Here a series of units is delivering cement at a high rate of capacity to bins from which cargo ships are loaded

period our total shipments to all users increased approximately 20 percent which indicates that we have substantially favored that industry in our distribution plan.

"It is my opinion that cement companies in general are favoring ready-mixed concrete customers, which is as it should be since we consider them to be our most important customers. It is possible that the members of your board of directors have focused their attention on a few cases of poor performance and have failed to give proper consideration to all of the facts. In either case, it must be remembered that our performance should be measured by our ability to manufacture cement rather than by the demand for it."

Canada Cement Co., Ltd., largest manufacturer of portland cement in Canada, reports that productive capacity of its plants was increased by 40 percent since 1946 but that additional output was still inadequate to meet the abnormal demand for cement. An advertisement was carried in all Canadian daily newspapers of December 7, 1950, in explanation of the present supply situation and to announce a new plant expansion program which, when completed, will have increased the company's cement production by 60 percent since the end of World War II.

The advertisement read: "CEMENT AVAILABLE IMMEDIATELY.

"Your cement requirements can be filled by our dealers now.

"The increase in productive capacity of our plants has reached a point where it is possible for us to fill all demands in all parts of Canada promptly.

"We are building a completely new

cement plant in New Brunswick, which is scheduled to come into operation in June, 1951. This plant will produce 800,000 bbl. annually. "Furthermore, another new addition is underway at Exshaw, Alberta, where we are building an extension to our plant which will increase our western output by 1,000,000 bbl. per year. This construction is also scheduled for completion in 1951.

"The new expansion programme, coupled with previous additions, will have increased our cement production by 60 percent since 1946. It is confidently expected that this increased output will result in an adequate supply of cement for all construction purposes."

An extremely interesting and timely letter on the subject of pricing practices was received from a midwestern cement manufacturer, as follows:

"Wholly separate and apart from any defense or war program, doubtless the most important economic legislation that will come before the 82nd Congress will be a bill to affirmatively validate the legal right of a competitor engaged in interstate commerce to meet his competition at the market place through the absorption of his economic disadvantages, freightwise and otherwise.

"The necessity for this grows out of the controversial question as to the meaning of the Supreme Court's decision handed down in April, 1948, in the Cement Case. Most lawyers advised their clients that they could not legally meet their competition through absorption of freight, and that they could legally sell only at rigid prices f.o.b. their factories or mills.

"During this long period of abnormal demand for cement, the major

portion of the cement producers held rigidly to their f.o.b. mill prices. Normally and traditionally, from the very beginning of the cement industry until the Supreme Court's decision, all cement manufacturers made it a practice to absorb their freightwise disadvantages in order to meet their competition at the market places. Shipments of portland cement during the year 1950 will approximate 225 million bbl. Had the manufacturers been free to follow their traditional marketing practices, whereby they absorb freight disadvantages in order to meet competition, the cement users would have saved during this year upwards of 35 million dollars.

"As you know, a bill to correct this situation, to-wit, S.1008, passed both Houses of the 81st Congress, only to meet its fate at the hands of the President who vetoed it. The importance of this subject and its relation to our national economy is such that it is likely to be a very live issue again when the new Congress convenes . . ."

Construction Outlook

Due to the uncertainties with respect to national and international affairs at this time, any forecast as to the probable extent of construction in 1951 would be hazardous and possibly subject to radical change in the months immediately ahead. Manpower shortages and regulations, allocations of materials and the extent to which the national economy is diverted to defense activities—now in process of decision—will greatly influence the total amount of construction and the allocation of construction according to classification.

It is apparent that everything made out of metal likely might soon be in short supply which would include not only much capital equipment, repair parts and supplies but also those building accessories that are essential to carrying out construction. It is also very likely that construction will be diverted to a considerable extent from civilian activity to military needs, the extent to be determined by the degree of mobilization of the nation's resources. According to some informed sources, civilian control very likely might be subordinated to military control on a scale never yet experienced and, in that eventuality, it is urged that the industry get its plants and equipment in the best possible operating shape.

Manufacturers of construction equipment, which includes power shovels, belt conveyors, large earth-movers, bulldozers and scrapers, diesel engines, rubber tires, crushing and screening plants, etc., have very recently gone on record that the equipment outlet is good for 1951. In spite of more pessimistic views, they believe that capacity is sufficient to meet a very large volume of civilian construction and the military requirements as they now appear to shape up. All-out mobilization, extraordinary diversion to manufacture of non-

civilian goods, the denial of vital component parts, or strikes could, of course, alter the optimistic predictions of manufacturers of equipment.

According to *Engineering News Record*, engineering construction for the first 50 weeks of 1950 was running 46 percent ahead of the previous year, with private construction 74 percent higher and public work running 20 percent up. The momentum of construction was well up as we entered the new year. Physical amount of new construction as well as dollar volume, was up in 1950.

A recent estimate of the construction volume for 1951, as prepared by the Department of Commerce following a special meeting of ranking industry representatives, indicates that total value of all new construction for 1951 would be 17.5 percent lower than in 1950 which would be very creditable. Percentage changes for the various categories of construction, as forecast, were either up or down in the ranges of a few to 40 or 50 percent with a few exceptions. It was predicted that industrial building would be up 75 percent and that military and naval facilities would be up 233.3 percent. The complete breakdown of estimates is shown herewith.

In these estimates, credit and other regulations in effect at the end of October, 1950, were taken into consideration but additional regulations to come with time, and their effects, were not evaluated. Dollar volume of work on new private dwelling units estimated for 1951 is based on 600,000 new starts during the year. Carry-over of work from 1950 into 1951 on industrial and commercial buildings is expected to be large as a result of the high volume of contracts let late in 1950.

While the value of the highway system is unquestioned in its contribution to national defense, the road-building program is already being threatened by manpower shortages.

Plant Expansion

According to recent estimates, whereas the portland cement industry



An innovation in some of the newer clinker cooling installations is the addition of clinker breakers, like this one at the discharge end, to eliminate oversize clinkers

will ship 220 to 225 million barrels of cement in 1950, of an annual capacity rated at 250 million barrels, another 10 million barrels of capacity will become available in 1951. Plant expansion is still going forward, and several new plants will come into production. The rate of expansion of facilities has been far more than apparently is commonly realized and has been augmented by a very substantial increase in production throughout the industry by virtue of improved efficiencies and the balancing of productive facilities.

Typical of the enlargement programs and improvements, since World War II, are the following comments from selected individual cement manufacturers:

A manufacturer in southern California: "I think it would be most appropriate to treat the subject on a regional basis, and a realistic regional basis such as Southern California, Northern California, Oregon, Washington and British Columbia so far as the Pacific Coast is concerned. The area which our plants serve; i.e., Southern California and Arizona is well entitled to such treatment. Each of the four companies supplying this market has increased capacity substantially. One company has completed a new plant in Arizona; another company has added a 350-ft. kiln; a third company is currently enlarging, and as you know, this company has increased its productive capacity by about two and a half million barrels annually. The total plant capacity in the Southern California-Arizona area is in excess of sixteen and one-half million barrels annually and the consumption in the area served by these plants in 1950 will not exceed fifteen or fifteen and one-half million barrels. In short, the Southern California-Arizona area has provided facilities fully adequate for the years which lie ahead, and if anything is over-produced rather than under-produced."

A small Eastern manufacturer: "This company planned its post-war expansion in 1944-45, arranged the financing in 1946 and commenced the work (which has continued through 1950) in 1947. As a result, we have produced more cement in each succeeding year from 1946 through 1950 and our production this year will exceed 1946 (the previous record) by about 55 percent. Our plans contemplate raising this figure to about 70 percent over 1946 by 1952 if the demand justifies it, which is questionable at this writing."

A manufacturer in the Lehigh Valley: "This low price of cement, which stimulates demand, also stands in the way of new plant construction. New capacity, I am told, represents a cost of \$6 per barrel of annual output. The manufacturer receives less than \$2.50 gross for each barrel sold. In other words, a plant with an annual ca-

capacity of one million barrels will cost \$6 million to build and promises a gross income when operating at full capacity of \$2.5 million per year.

"Investors in new cement capacity are promised, therefore, a turnover on their capital of no better than once in 2½ years. As less than capacity operation has been a characteristic of the cement industry, a turnover of capital in three to four years is more likely to be realized. Is there any wonder that capital is not attracted to the construction of new cement plants? Increased capacity, therefore, must come, in the main, through improvements and enlargements to existing plants.

"The need for increased capacity varies widely from territory to territory across the country. Generalization on this matter is difficult, if not impossible. It seems probable, however, that stringencies encountered during 1950 will not be experienced again for several years.

"As you know, there is a large amount of modernization work planned and in progress. The bulk of this appears to be directed towards improved efficiency, although some improvement will result in increased output. Most of this work is being financed by current earnings. As taxes on corporation earnings increase, the amount of money available for plant improvement must decline. There is, therefore, no assurance that the industry will materially increase present rates of rehabilitation and expansion unless the promise of financial gain from such work is increased.

"In our case, we embarked on a program of plant improvement to extend over a three-year period. As a first step dust collectors were ordered for the waste heat boiler stacks, for the mill rooms and the rock crushing and drying department. This work is currently going forward. It was our plan to install an auxiliary boiler during the coming winter for the purpose of supplementing steam generation from waste heat boilers, so as to eliminate some of the variations in electrical power generation now experienced.

"While the order for this equipment has been placed, deliveries are such that the boiler will not be installed before this time next year. It was then our plan to proceed with the replacement of the kilns over a two-year period. Following the Korean invasion by the Communists, the likelihood of sharply increased corporate taxes and the scarcity of steel plate caused the deferment of the kiln program. While we are going ahead with our engineering on these and other plant improvements included in the program, it seems unlikely that we will be able to undertake the replacement of kilns within the foreseeable future."

Allentown Portland Cement Co., Catasauqua, Penn., listed the following improvement and expansion pro-

gram as completed or under way in 1950 and 1951:

"An entirely new coal grinding equipment, consisting of XA Ruggles-Coles dryer and 7- x 26-ft. tube mill with transformer station and dust collecting equipment. Fuller-Kinyon conveying for conveying the pulverized coal from mill to kiln storage bins.

"Erection of a complete new machine shop and storage house, 42 ft. x 234 ft., of cement block and steel construction. Machine shop and storehouse is completely equipped with overhead trolley and new machine tools. It is so arranged that material can be unloaded direct from cars or trucks within the building.

"Within the last year we have completed a new addition to our finishing department for grinding high early and masonry cements. This includes complete poidometer set-up for handling the materials for masonry cement to be pulverized.

"Installation of a 7- x 35-ft. tube mill and a 16-ft. Sturtevant separator.

"The old grinding plant has been modernized by installing Airlslides, replacing screw conveyors, and a complete new Fuller-Kinyon System for handling the products from the old, as well as the new unit, together with Fuller cement coolers on all grinding units.

"In the packhouse, we have installed new St. Regis modern packers, together with iron mesh conveyor belt for conveying the sacks to the cars."

A Lehigh Valley manufacturer: "We do not contemplate any enlargement of our plant. We have concentrated on improving the operating efficiency and by careful operation we have been able to increase the output of the existing units. In the beginning of the year we completed a reconstruction of our crushing plant, pictures of which have appeared in *ROCK PRODUCTS*, and we have also made a number of worthwhile improvements in our quarry operation."

A small southern manufacturer: "We have some plans for reconstruction but we have no present plans for enlarging this plant. We have succeeded in increasing the capacity of this plant by about 50 percent above what it was for a great many years by better methods not by additional equipment."

Halliburton Portland Cement Co., Corpus Christi, Texas, completed a new plant early in 1950 which was described in the August, 1950, issue of *ROCK PRODUCTS*, pp. 116-135. Since that time, according to a letter received, the company has made the following plant changes:

"We have just completed and are operating our oyster shell washing system. You will remember what a long haul it was with that crane all the way from the barge slip to the shell bins. The shell now goes from the barge to the crane bucket to a hopper feeding into the shell washing system, all of which is located adjacent to the end of the barge slip.

"From there the shell is fed by a vibrator feeder onto some Allis-Chalmers shaker screens where the shell particles are separated into three sizes and washed thoroughly. Everything smaller than ½ in. is pumped to an Akina classifier which washes and saves everything larger than ½ of an inch. The waste material is picked up by a 12 in. pump and pumped out to the backyard to build up our real estate.

"After emerging from the shell washer, cleaner than anything we ever experienced, the shell rides on a conveyor belt almost the entire distance from the end of the barge slip to the shell storage bins. We have a tripper located on top of the shell conveyor trestle which will enable us to divert the clean shell into any bin we desire or store it anywhere we wish in the area between the bins and the shell washer.

"Of course, this greatly improves our raw material situation. We will now be able to have shell slurry with only a fraction of the amount of silica in it which we had before. Up until now we have always been on the ragged edge with just about as much silica in our raw mix as we could stand. But now we don't have to worry about that any more. Furthermore, the cleaner the shell the lower the viscosity per slurry weight so our percentage of solids in shell slurry and raw mix will be considerably higher. All this means that we will expend less fuel in the burning operation per barrel and use less classifier sand and bauxite for correcting the raw mix.

"The storage capacity of our shell slurry thickener will also be increased because the final density of the shell slurry will be increased. Our grinding capacity will also be increased because we are able to save a much greater percentage of the fines. In brief, there is scarcely an operation throughout our entire plant that should not be improved directly or indirectly by this improvement in our shell handling. I almost forgot to mention that since the crane does not have to go the entire length of the runway and back just to unload 5 yards of shell, our unloading capacity will be more than tripled.

"Since we are now washing our shell more cleanly and efficiently ashore, we no longer wash it aboard the dredge. During the past three months our dredge has been undergoing a major overhaul. You might even say that it was practically rebuilt. It is now operating in Nueces Bay and furnishes us with all of the shell that we need. While we were at it we also made some important improvements on our little tugboat in order to adapt it more to our operation. The net result is that we will be able to go almost anywhere in the bay and get shell which will be suitable for our needs. After it goes through our shell washer it will be as clean as any oyster shell you ever saw. It is

(Continued on page 144)



View of new distributing plant at Green Bay, Wis., taken from the air

Clinker capacity of world's largest mill increased ninety percent since V-J Day; clinker shipped by water to Superior, Wis., for grinding; new distribution plants at Superior and Green Bay

HURON'S PROGRAM TO INCREASE CEMENT PRODUCTION

IN THE AUGUST, 1949, issue of ROCK PRODUCTS, an article was published describing the applications of Fuller-Huron Airslides and Airfeeders at the Huron Portland Cement Co. mill at Alpena, Mich., and at several distributing plants of the company on the Great Lakes. The versatility of these feeding and conveying devices in the improvement of plant efficiency and their contribution to increased production was emphasized at that time.

Since the original article was published, the company has demonstrated more fully the effective application of these devices in an enlargement program at Alpena and, for the first time, in the design of two new distribution and packing plants. Their use has been further applied in the other distributing plants to speed up packing and loading bulk cement and to render improved customer service.

There are those who would be inclined to criticize portland cement manufacturers for alleged reluctance to increase capacity sufficiently to satisfy the demands for cement that have exceeded supply during recent years. We doubt if these critics are fully aware of what has been accomplished. New plants and heavy capital investment for additional kilns, new grinding departments and the like have commanded attention but important contributions to increased capacity of less spectacular nature have been made. The use of improved methods of feeding and conveying materials, au-

By BROR NORDBERG

tomatic controls, instrumentation, the balancing of output between the several mill departments and general tightening up of existing operations have contributed substantially to the supply of cement.

In the case of Huron Portland Cement Co., productive capacity of cement clinker has been increased by 90 percent since V-J Day, which is far more than the average for the industry. Of the total increase, 75 percent is credited to the installation of six new 10- x 153-ft. rotary kilns and 15 percent to improved efficiency of ex-

isting operations. The latter percentage, in the case of the world's largest cement mill with a capacity in excess of 7 million bbl. annually, represents several hundred thousands of barrels of cement. Milling methods for both raw materials and clinker, and handling and feeding principles had to be revised to keep pace with increased kiln output, and, for that matter, in order to attain the present kiln production.

In this article, expanded production facilities made since V-J Day including adjustments to existing facilities for improved efficiency and increased output, and the new distribution plants are considered.

The mill at Alpena is a waste-heat,



New distributing and packing plant at Green Bay has 100,000 bbl. storage capacity. Cargo ship is pumping cement through two 10-in. lines into surge bin above for distribution into silos

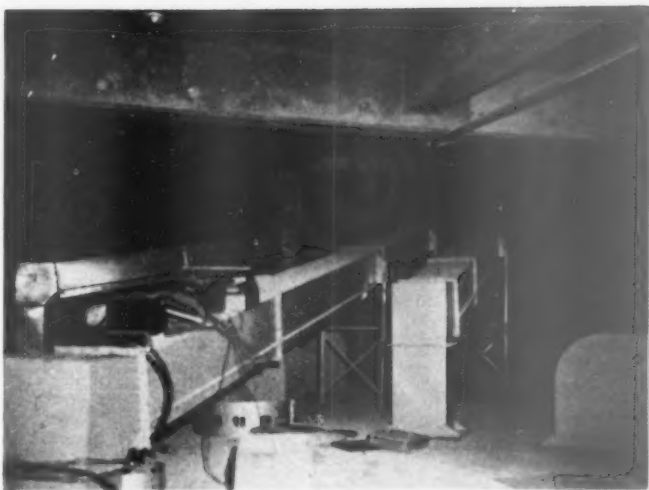
dry process plant and now has 20 rotary kilns each with individual waste-heat boilers, economizers and stack dust collectors. No supplemental electric power is required and the plant is self-sufficient in that respect. There are eight 8- x 110-ft. rotary kilns and twelve measuring 10- x 153-ft. Of the latter, four were installed shortly after World War II and two went into service during 1950. The latest installation, of two kilns, increased clinker capacity by 15 percent to a daily output of 19,500 bbl.

More than 90 percent of the output of the plant is moved in bulk by cargo ships to Great Lakes ports where the company operates packing and distributing plants. These plants are located at Detroit, Mich.; Cleveland, Ohio; Duluth, Minn.; Milwaukee, Wis.; Buffalo, N. Y.; Toledo, Ohio; Saginaw, Mich.; Oswego, N. Y.; Muskegon, Mich.; Green Bay, Wis.; and Superior, Wis. A completely new plant has just been built at Green Bay, Wis., and the Superior, Wis., facility is entirely new and features a clinker grinding plant in connection. Cement is delivered from Alpena to the distributing plants in three cargo ships operated by Huron Transportation Co. which is a subsidiary. The *S.T. Crapo*, *S.S. John W. Boardman* and the *S.S. Samuel Mitchell* carry 45,000 bbl., 32,000 bbl. and 18,000 bbl. of cement respectively.

Green Bay Plant

The new distributing plant at Green Bay, Wis., provides 100,000 bbl. of cement in storage and has every facility to expedite the loading of trucks and railroad cars with five types of cement. It represents the most modern practice yet for the company, being the first large-capacity operation designed specifically around the use of airlifts and airfeeders. Outstanding features are automatic operation controllable from a central location and the provisions in material handling to provide flexibility and yet prevent contamination of one type of cement with another.

For those unfamiliar with the airlift, it is a conveyor without moving parts, consisting of a sheet metal duct (usually enclosed and air-tight) with the material to be conveyed resting on a fabric separating the upper part of the duct, which is rectangular in vertical section, from an air chamber below. Air is introduced into the air chamber at the rate of 3-5 c.f.m. per sq. ft. of fabric at 4 to 12 in. (w.g.) pressure. The permeability characteristics of the fabric are such that the material to be conveyed is uniformly fluidized and thus the angle of repose is changed and the material is conditioned to flow if the conveyor has sufficient slope. The angle of slope required is in the 4 to 6½-deg. range dependent upon the material. Airlifts have very high capacities and require no drives, the only power unit being the drive on the blower (See



This view of the Green Bay plant shows airlifts radiating from surge bin to put cement into separate silos as it is pumped from cargo ship into overhead bin

ROCK PRODUCTS, August, 1949, pp. 115-124 for a detailed article on the airlift and airfeeder).

At Green Bay, a slip had to be dredged to accommodate the cement cargo ships which pull alongside the plant to pump their cargoes into the silos. As shown in the accompanying drawings, there are 12 reinforced concrete silos with conical bottoms arranged in three rows of four with 6 interstice bins and there are five supply silos to handle five types of cement. The silos have a capacity of 7000 bbl. each, the interstice bins hold 1900 bbl. each and each supply silo has a capacity of 1000 bbl.

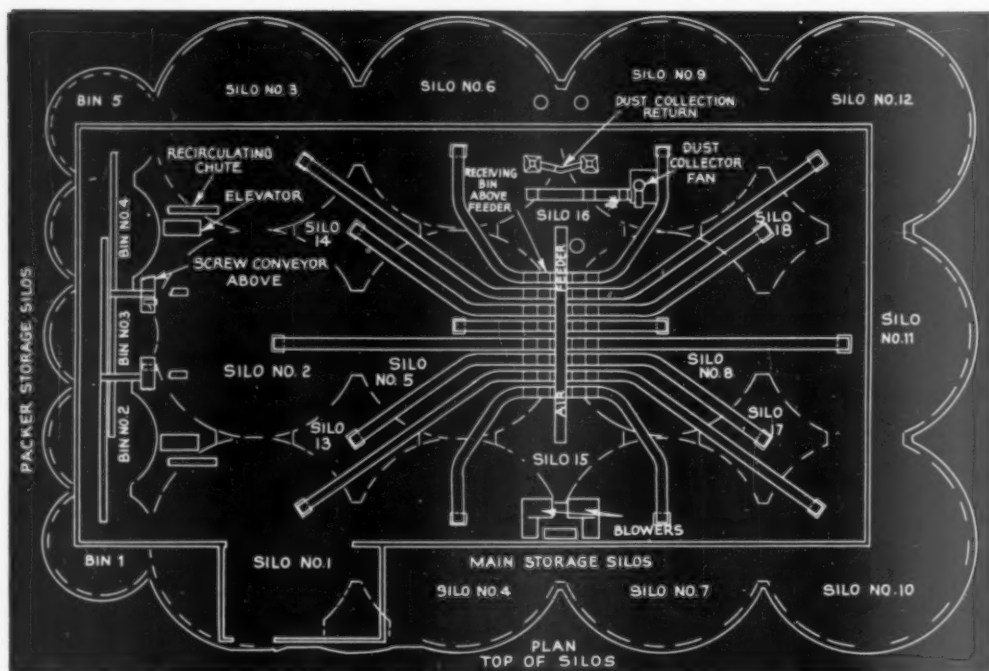
Cement is pumped from the hold of a cargo ship into a 75-bbl. surge bin

on top of the silos at the rate of 2200 bbl. per hr., from which individual 16-in. airlifts sloped at 1¼ in. to the foot (18) radiate out to discharge cement into the 12 silos and six interstice bins. Each of the 16 airlifts receives its feed through an individual airfeeder, and a single airlift is operated at a time to take the entire output of the cement pumps. Binaidicators on the surge bin flash lights aboard the cargo ship in the event that the level is abnormal and the operator is governed accordingly.

A dual system is provided for the transfer of cement from any of the silos or interstices into any of the five overhead supply silos. Two 14-in. parallel enclosed screw conveyors below



Steamer Samuel Upson being loaded with 7000 tons of cement clinker for Huron grinding plant at Superior, Wis.



Plan of storage silos at the Green Bay plant

the two rows of interstice bins are the means of transfer to two enclosed bucket elevators, to raise the cement for distribution into any of the five supply silos overhead. Flow of cement from the interstices into the screw conveyors is put through an airfeeder in each case for direct transfer. Airfeeders and 8-in. airslides transfer cement into the screw conveyors in an arrangement that permits cement from silos in two parallel rows to be transferred to one 14-in. screw conveyor. Bindicators mounted in the top of each screw box actuate solenoid valves when the level of the cement presses against the diaphragm, thus automatically shutting off and turning on the air supply to keep a constant and full feed of cement in the screw conveyor.

Overhead, the distribution into the supply silos is accomplished entirely by airfeeders and airslides as shown in the accompanying sketch. Each elevator empties into an 18-in. screen conveyor which rejects lumps and other undesirable material, and the cement stream is routed into the supply silos as shown, by 2-way airfeeders and airslides so that the cement handled by each elevator can be diverted into either of four adjacent supply silos. Through remote control by means of solenoid valves opening and closing air valves at the separate airfeeders and airslides, any of the supply bins may be selected for filling. Each supply silo is fitted with Bin-

dicators. A low level Bindicator indicates when the silo is nearing empty. The high level unit automatically shuts the feed when the silo is nearly full and the circuit is provided with time delay devices to clear the elevator and conveyor before shutdown of the system. When the silo has emptied sufficiently for further filling, lights so indicate on the control board.

Cement is drawn from any of the supply silos for bulk loading of cars or trucks or for transfer to the feed hoppers of 4-spout St. Regis packing machines, and five discharge openings

are provided in the bottom of each silo for the purpose. Presently, there are two packing machines but the layout provides for a third one. Cement can thus be drawn from a single silo for transfer to five points simultaneously if desired. Airslides fed by airfeeders convey the cement into the packing machine hoppers and for direct loading in bulk. To facilitate flow, most of the airfeeders are supplemented where applicable by Bin-Flo aerator units mounted near the draw-off points from the silos. These units are small flat trays covered by a high permeability fabric diffuser and three are usually mounted near the drawoff point of a bin cone bottom to introduce fluidizing air at low pressure.

The operator responsible for bulk loading or packing controls the flow of cement from his station. Each packing machine hopper has high and low Bindicators which automatically regulate the flow into the hopper by opening and closing solenoid valves which start and stop the flow of air for operating the feeders and airslides filling the hopper. Spillage is conveyed by a 6-in. airslide from a hopper at ground level and elevated into the packing machine hopper.

The plant has five bag-type Sly dust collectors, one serving the equipment at the top of the plant, two the transfer equipment and the other two the packing machines. Seven blowers are required for the operation of the airfeeders, airslides and Bin-Flo aerator



One of airfeeders and airslides to transfer cement from a silo to screw conveyor for elevating to supply bin, at Green Bay plant



Superior, Wis., plant. (Left): This view shows flexibility of airslides in making bends. Here, airslide below is conveying mill stream to elevator to air separator. Top one is transferring dust to bottom one from dust collector. Center: Separate feeders for proportioning clinker and gypsum for feed to grinding mill. Right: Gypsum bin, right, and clinker bin, left, with feeders below for proportioning to mill

units as separate air circuits. Two blowers serve the packing operation, two the bulk-loading facilities, two the transfer systems and the seventh is for the boat unloading operation. Motor drives on the blowers range from 7½ to 20 hp.

Cement is loaded in bulk directly into trucks as they are spotted on a 50-ton Buffalo scale that is 50 ft. in length, for weighing while loading. Due to the great capacity of airslides, bulk cement can be loaded into cars at the rate of 3000 bbl. per hr. Trucks carrying 100 bbl. of bulk cement are loaded at the rate of 10-12 per hr. The bulk of the cement is shipped by rail.

Cement in sacks is dropped on wire mesh conveyors and transferred on to conveyors for loading to trucks or railroad cars. There are three conveyors arranged in a row—reversible—so that cement from either packer can be loaded to trucks at one side of

the building or to railroad cars on the opposite side.

A Flexoveyor has been installed to facilitate handling sacked cement into cars and thus to eliminate hand trucking and speed loading. The Flexoveyor consists of a series of endless spring belts running over grooved rolls which together make up a conveyor. Due to its construction, the conveyor may be inclined up through operation of a hydraulic jack and, through pressing a control button, the conveyor may be moved forward or withdrawn according to where the sacks are to be piled. It is mounted on four pneumatic rubber-tired disc wheels and the forward end is supported by a steel dolly on casters.

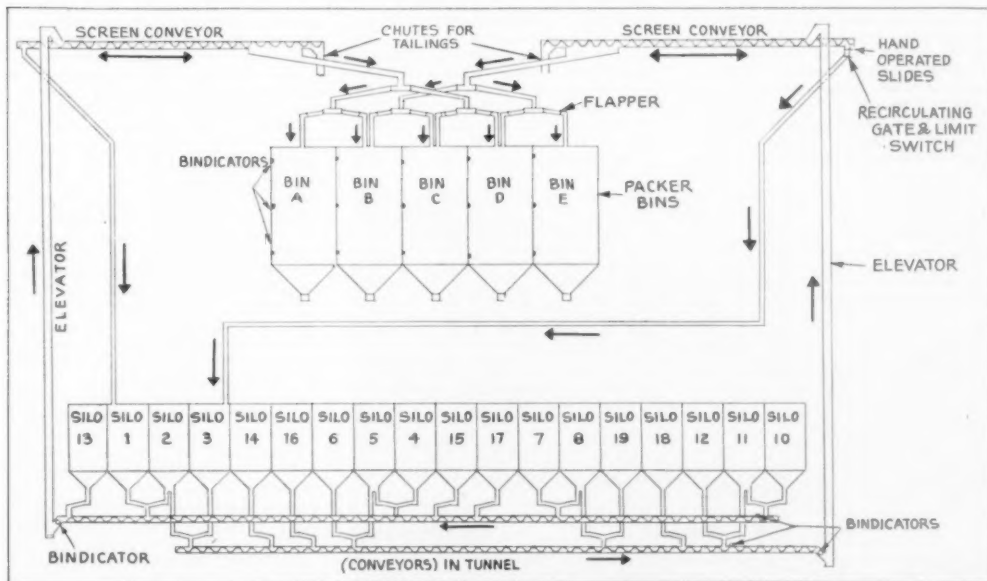
The Green Bay plant represents the most up-to-date installation of air-feeders and airslides in any of the company's plants and the utmost in their adaptation to automatic and controlled operation for which they

are admirably suited. The entire system is interlocked to prevent plugging resulting from electrical failure of any driven unit. The reader is referred to the article on airslides published in the August, 1949, issue of *ROCK PRODUCTS* for a flowsheet and control diagram (p. 118) of the Detroit distributing plant which shows in detail how interlocking and automatic operation are accomplished.

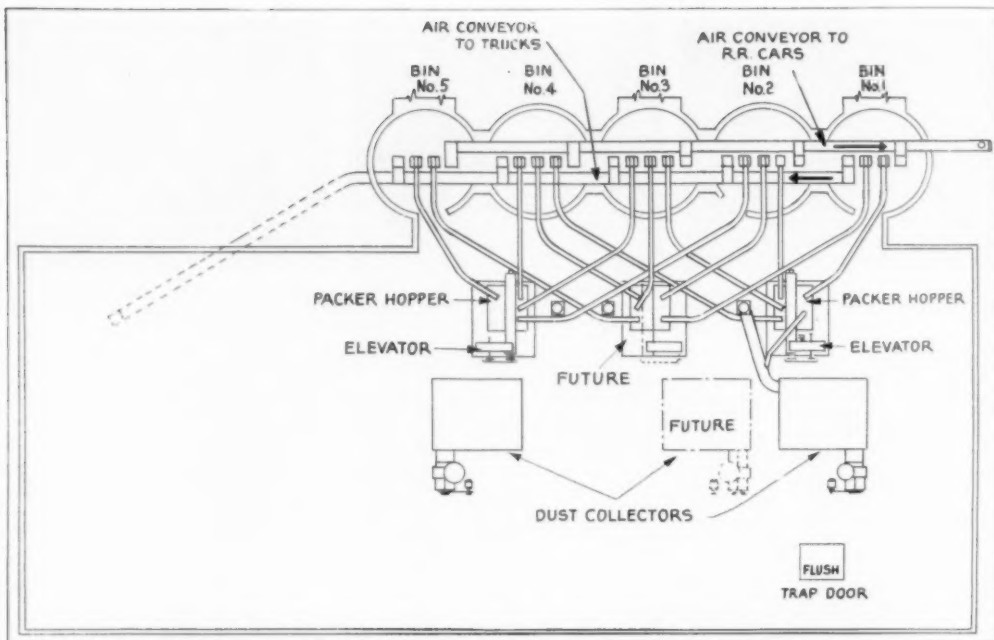
Superior Plant

At the same time that the Green Bay plant was built, which will eventually replace an older facility at that location, a new packing and distributing plant was completed at Superior, Wis., which is a new location. This plant is similar in its main design features to Green Bay but is operated in connection with a clinker grinding plant built to grind cement from Al-pena clinker.

Several considerations made it ad-



Drawing shows handling arrangement between silos and bins at Green Bay operation



Drawing indicates flow of cement from bins to packing machine hoppers and for bulk loading at Green Bay plant

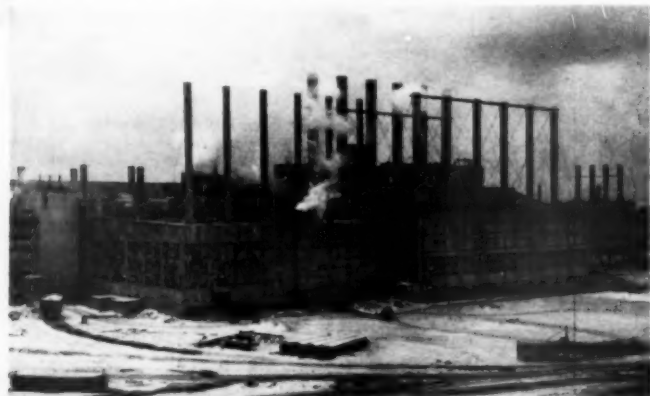
visible to ship clinker rather than cement to Superior. Due to the long and severe winters in the Superior-Duluth area, it has been a serious problem in recent years to stock sufficient cement to tide over the months when the season is closed for shipping by water. In this area the navigation season is closed from December 10 until April 23, according to long-time averages of weather bureau reports, but sometimes is closed as early as November 15 and extending as late as May 15. The choice was to build tremendous storages in silos for finished cement or to ship clinker to be ground at des-

tinuation and then be stored in silos in accordance with market demands. Another reason for the decision to grind clinker at Superior was the increased clinker production at the Alpena mill since two additional kilns were added. Physical limitations to expansion of the finish grinding department at Alpena were such that it was much simpler to build additional grinding capacity at another location. Clinker is shipped from Alpena in ore-type ships which are unloaded by an overhead crane with clamshell bucket to storage at Superior. Storage capacity is 400,000 bbl. in the form of clinker

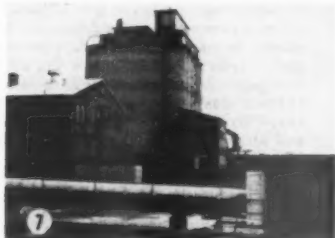
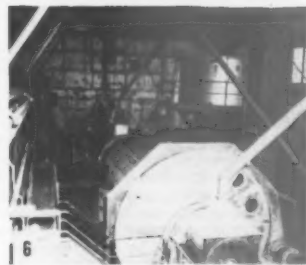
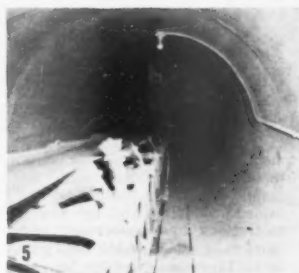
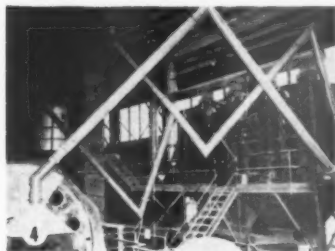
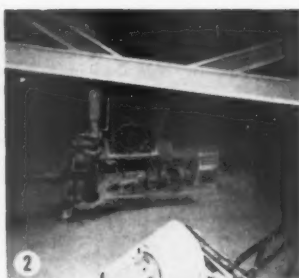
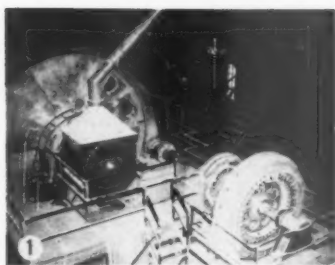
and 52,000 bbl. of cement in the cement distribution plant and its supply bins. Standard portland cement and air-entraining cement are ground; other cements being shipped in cargo ships from Alpena, Mich.

Grinding is done in a steel and galvanized iron mill building that was moved intact from another location to the site selected alongside the waterfront. Gypsum rock is received in covered hopper cars on a railroad siding alongside and is transferred into the plant by an unloading screw conveyor for elevation and spouting to any one of three 100-ton bins. Clinker is stored in a pile over a conveyor tunnel of precast concrete sections. Clinker is fed from the stockpile to a tunnel belt conveyor by means of a Jeffrey vibrating feeder from one drawoff point. A bulldozer is used as needed to work the clinker over the drawoff point. Delivery to the plant is over four consecutive 18-in. Barber-Greene belt conveyors and transfer to a bucket elevator filling a 100-ton bin within the mill building.

Three hopped-bottom gypsum bins rather than one large bin were provided in order to take the capacity of a car without requiring excessive elevation. Through a system of drawoff valves and spouts, transfer is made via the one bucket elevator from two of the bins into the third, alongside the clinker bin and it is from these adjoining bins that the clinker and gypsum are proportioned for grinding mill feed. Individual Jeffrey Waytrol



General view of cement mill at Alpena, which is the largest capacity plant in the world



Superior, Wis., plant: (1) Discharge end of grinding mill showing 800-hp. motor and magnetic clutch; dust collector in right background. (2) Cement pump for transporting cement to silos in distributing plant through water-cooled pipe line. (3) View of plant; grinding mill is on left, with railroad line between it and distribution plant on right. (4) Zig-zag arrangement of piping to dust collector in background is effective way of preventing dust from settling in piping; air separator is in background. (5) Interior of precast concrete tunnel under clinker pile, showing conveyor. (6) View of grinding mill, showing 2-compartment mill, feed bins in back and air separator. (7) Conveyor in foreground is transporting clinker from storage to grinding mill. Grinding mill building is on left; silos in background. (8) Clinker is stockpiled as shown by crane from ship's hold and is drawn off by tunnel conveyor. (9) Airlide conveys air separator rejects into feed elevator for return with fresh feed into grinding mill. Note level device which can stop system if conveyor becomes too full

feeders regulate the proportions into a short bucket elevator which feeds into an 8- x 30-ft., Allis-Chalmers 2-compartment Combel mill. The mill is driven by an 800-hp. synchronous motor through a Cutler-Hammer magnetic clutch and carries a charge of 41,000 lb. of 4-, 3½-, 3- and 2-in. forged steel grinding balls in the first compartment, with 113,200 lb. of 1½-, 1¼-, 1- and ¾-in. balls in the second compartment.

Grinding is in closed circuit with a 16-ft. Sturtevant mechanical air separator. Rejects are returned into the mill via the feeder elevator and the cement drops directly into the hopper of a 6-in. Fuller-Kinzyon pump for direct transfer into the nearby distribution plant silos.

The grinding system is a conventional grinding circuit with approximately 150 percent circulating load but some of the details are of special interest. One is the use of airlides for handling the mill stream and re-

jects and the automatic protective controls available through their use.

The airlide conveying the mill discharge into the boot of the elevator for direct transfer into the mechanical air separator, shown in one of the illustrations, is a good example of how these units may be curved to transport materials in any direction.

A second airlide conveys the air separator rejects into the mill feeder elevator for return into the grinding mill. A third, with an airfeeder, transfers dust from a Parsons bag-type dust collector into the mill-stream airlide. The collector is a continuous-discharge, automatic type which ventilates the mill and collects the dust generated throughout in processing.

In connection with the dust collector it will be noted from the illustrations that all piping is of a zig-zag pattern and that sharp angles in excess of 45 deg. are provided in preference to long radius bends and horizontal runs. The design was to avoid

dust settlement in the piping, which often is a troublesome occurrence in the handling of dusts, and apparently the scheme is working very well.

All equipment in the plant is interlocked starting at the discharge end, through electrical interlocks between the starters for the motors on all equipment. Additional protective devices are provided through the use of Bindicators and solenoid valves. The transfer of cement into the silos from the F-K pump line is by a 6-in. airlide and a Bindicator is provided on that conveyor to guard against plugging. If the conveyor fills to too high a level, the pump shuts off automatically as does all the equipment preceding the pump. A Bindicator on the F-K pump hopper is effective in shutting off the system if the cement backs up in the hopper.

Two Bindicators are provided on the airlide conveying the mill stream to the bucket elevator which discharges into the air separator. One is

a guard against failure of the elevator and the other against failure of the airslide. Another unit, on the separator reject airslide, is a protection against plugging.

Interlocking is such that upon failure of any unit, or in case of plug-ups, all equipment preceding the point of fault will automatically stop. For example, if backup in the F-K pump hopper trips out the pump motor, through actuation of the Bindicator diaphragm, all equipment including the grinding mill automatically is stopped. After the difficulty is discovered and corrected, the system must then be started up by the operator.

At the miller's platform there is a control board with signal lights and the necessary related devices for all operating equipment. The miller has control of the clinker stockpile feeder and the conveyors, at his station, and these pieces of equipment are also electrically interlocked.

Average daily production is 2500 bbl. of standard portland cement and air-entraining cement. Air-entraining cement is produced by introducing unneutralized flake vinsol-resin and caustic soda into the grinding mill. Proportioning is done with a Clarkson reagent feeder interlocked with the Watrol feeders.

Cooling water pumps had to be provided, one for a source of supply to the F-K compressor and the mill bearings and a second for the water jacket surrounding 60 ft. of the F-K pump line to the silos for cooling the cement. Drives on these pumps, too, are interlocked with the grinding system.

Cement from the F-K line dis-

charges into an airslide of 150 bbl. per hr. capacity which has side discharge gates for distribution to six silos and two interstice bins. Combined capacity of the silos, interstices and five supply silos is 52,000 bbl. The packing and bulk-loading arrangement is similar to the Green Bay plant.

Alpena Cement Mill

As stated earlier, the capacity for manufacturing cement clinker at the single cement manufacturing plant of Huron has been increased by 90 percent since World War II. A major part of that program was completed in the 1946-1948 period when four 10- x 153-ft. rotary kilns were put into service. Then came the 1950 increase with two additional kilns, bringing the total to 20 units.

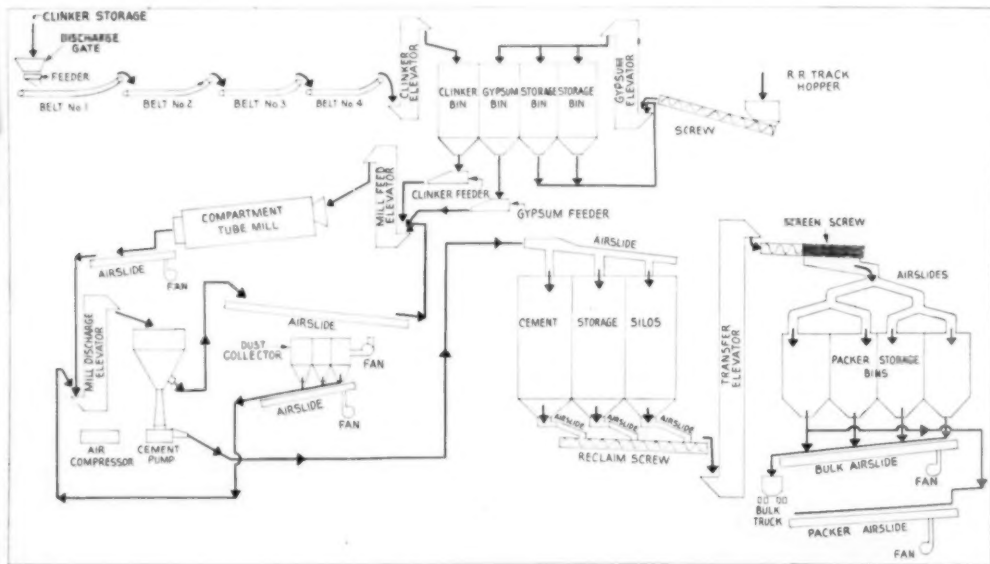
There was far more to the program for increased capacity and attainment of status as the world's largest cement mill than actual new equipment installation. The raw mill, for example, was the bottleneck to sustained production and, due to physical limitations to enlargement, involved more than adding additional grinding units. Increased demands for raw materials focussed attention to getting the utmost production out of the existing mills at the time new kilns were being added rather than add new mills. Experimental work was conducted on one of the grinding circuits and the findings applied to the others, with the result that the output per mill has been increased from 19 t.p.h. up to 28.5 t.p.h. of 91 percent minus 200-mesh material over a 5-year period. The figure was 27 t.p.h. a year ago.

Raw Mill

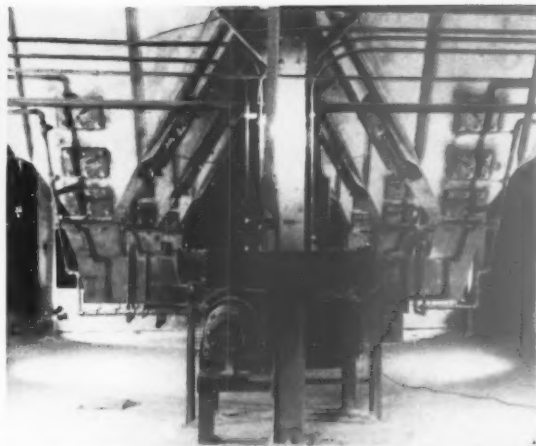
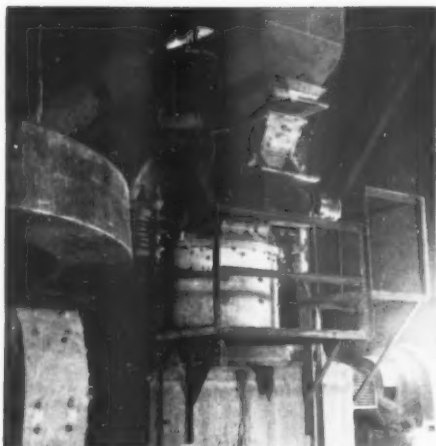
There are nine raw grinding circuits, each consisting of a 7- x 26-ft. Compeb mill in standard circuit with a 14- ft. Sturtevant mechanical air separator. Each mill is vented to an American Wheelabrator bag-type dust collector.

Much of the increased capacity was achieved through increasing the circulating loads in the grinding circuits. Vibrating screens were first installed to screen out minus 1/2-in. material ahead of the hammermills. At the separating heads within the Compeb mills, the grids were replaced by plain division heads so that the mills could be operated as modified tube mills. Circulating loads were thereby increased from 50 percent to 200 percent. Other contributing factors to increased capacity were the installation of Hardinge Feedweights in order to get uniform rate of feed into the mills, and increased mill speeds. Increased outputs of the magnitude accomplished could not have been made without the installation of airslides to replace existing screw conveyors.

Additional increases are expected when a new system of dust return is placed in operation. In the contemplated system, all dust from the kiln housings, boilers, economizers and Cottrell dust collectors will be conveyed by screw conveyors, elevators and airslides into a 500-ton bin which is one of six such bins recently installed for raw materials. Dust from this bin will be fed out by an airfeeder into a short screw conveyor, with a Bindicator as a control device, and



Equipment arrangement of Superior plant, Huron Portland Cement Co.



Left: Bowl mill firing No. 12 kiln at Alpena, showing coal feeder equipped with adjustable speed drive and automatic control. Right: Automatic, time-controlled system of dust discharge from six precipitator hoppers at Alpena. This view shows timer and screw conveyor drive in foreground, airfeeders and airslides in rear. Farther back are 11 more units discharging dust from economizer and boiler hoppers

will be elevated into an 18-in. screw conveyor running the entire length of the raw mill building. From this screw conveyor, nine Jeffrey vibrating feeders will regulate the feed of dust equally at each mill, discharging into the boot of the bucket elevator carrying the mill discharge to the mechanical air separator.

Rate of feed of all nine feeders will be controlled from one master control device so that the proportions fed each mill-separator circuit will be equal. An excess will be maintained through the 18-in. screw conveyor and the overflow will be returned to the dust bin by airslides and bucket elevator. Since the amount of the dust varies, the rate of feed from the feeders will be adjusted accordingly as the level of the dust in the bin fluctuates which will be indicated by Bindicators. According to experiments, it is probable that most of the dust can be recovered in this way but provision will be made to divert any required portion to waste. The important feature of this handling method is that the dust will be returned into the circuit without passage through the mill which should reflect in increased mill output.

Finish Grinding

As clinker output was stepped up, clinker grinding capacity was inadequate and that department came in for revision. There are 12 No. 724 Compeb mills. Prior to World War II, eight of the mills were operated as preliminary mills in closed circuit with air separators and finish grinding was open circuit through four mills. The principal change was opening up of the clinker crushers to $\frac{3}{4}$ in. from $\frac{1}{2}$ in. and the installation of six Hercules mills for preliminary grinding to 700 sq. cm. per gram at 200 bbl. per hr. each. Then, the 12 Compeb

mills were all arranged for closed-circuit finish grinding with higher circulating loads resulting in a step-up in production from 16,000 bbl. per day to 25,500 bbl. Clinker grinding capacity now is a sustained average of 28,000 bbl. per day including the 2500 bbl. output at Superior, Wis.

Kilns—Clinker

The two new kilns installed in 1950 are identical to the other 10- x 153-ft. kilns. They are direct-fired by Raymond coal mills and each has a separate 1000-hp. Wickes waste heat boiler, Green economizer and Cottrell electrical precipitator. The kilns exhaust at 1600 deg. F. and the exit temperature is reduced to 400 deg. F. through the boiler and economizer. Drives on the kilns are 2-speed electric motors and, it is of interest, that top speed is 44 r.p.m. The trend in the industry has been to higher kiln speeds in the range of 75 r.p.m. or faster but Huron's experience is that increased clinker production is attained through the use of lower speeds. All kilns are being equipped with Fuller constant-head feeders for more uniform regulation of feed.

Shipments in cargo vessels can be made from Alpena only during the open navigation season, so the mill must be operated the year-around, and enormous storages of clinker and cement must be built. Storage capacity for cement is 750,000 bbl. and is now unlimited for clinker since the walls have been removed from the storage area for extension into the open. Bulldozers are being used for trimming the large stockpiles that must be built during the winter months. Possibly in excess of one and one-half million barrels of clinker will be in stock in anticipation of the coming navigation season.

Productive capacity of the plant is now approximately 7,500,000 bbl. of cement clinker annually and all mill departments are now brought into balance for maximum production.

In connection with the building of the clinker grinding plant at Superior, special facilities were constructed at Alpena to load clinker into ships at the rate of 5300 bbl. per hr. Five Jeffrey vibrating feeders, rated at 300 t.p.h. each, feed clinker out of storage on to a belt conveyor and, by a system of belt conveyors, the clinker is elevated and conveyed over the finish grinding building and stockhouse to the dock. Here, transfer is made to an extendable shuttle belt conveyor for direct loading.

The foregoing is a summary of an enterprising program to keep pace with demands that are the greatest in the history of the company. It has embraced tightening up for efficiency throughout plant operations, heavy investment in new machinery, and improved and new distribution facilities to expedite handling to the ultimate customer.

Personnel

Emory M. Ford is president of Huron Portland Cement Co.; Frederick S. Ford is vice-president; Paul H. Townsend, vice-president and general manager; H. Ripley Schemm, vice-president in charge of operations; Clarence L. Laude, vice-president in charge of sales; William W. Crapo, secretary and assistant treasurer. Clinton P. Harris is mill manager at Alpena, William G. MacDonald is mill superintendent and Albert C. Fowler is chief chemist.

Herbert A. Browne, chief engineer at Alpena, and Arthur C. Dane, chief engineer at Detroit, with their engineering staffs, were responsible for

(Continued on page 160)

History



View of plant in South Columbus, Ohio, from the air, showing stockpiling area and, in background, lake development

Development of largest producer and its operating practices which have influenced the industry summarized on occasion of fiftieth anniversary of its president in the industry

AMERICAN AGGREGATES CORPORATION'S CONTRIBUTIONS TO THE SAND AND GRAVEL INDUSTRY

By BROR NORDBERG

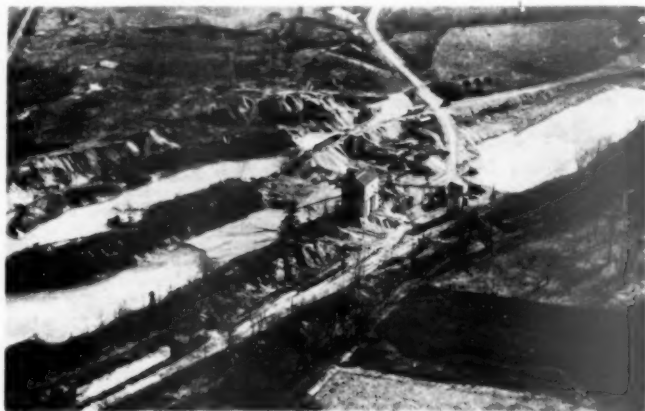
GREENVILLE, OHIO, is a thriving little city of 9000 people in the southwestern part of the state. The community is in an area rich in agriculture and is a city that takes pride in its many and varied civic activities.

Greenville is the national headquarters of the American Aggregates Corp., world's largest producer of commercial processed sand and gravel, which operates aggregates plants located throughout the states of Ohio, Michigan and Indiana. It is no accident that a company with unsurpassed reputation for its ability as a producer of sand and gravel and which does an annual volume of aggregates business in excess of 7 million tons has its principal office in such a small city.

American Aggregates Corp. had its beginning in the Greenville area and chose to continue its operations there, where it has had opportunity to share its prosperity and contribute materially to the welfare of the community. The company has always recognized the public interest in the conduct of its operations and has contributed public parks, a large recreational area and other facilities as permanent monuments of its interest in the public welfare.

On December 7, 1950, Fred D. Coppock, founder and president of the company, was honored with a dinner

at the Greenville Country Club, given by his business associates in recognition of his 50th year in the sand and gravel industry. Mr. Coppock has likely done more than any single individual in the United States to hasten bringing the production of sand and



Present modern plant at Fort Jefferson. Lakes being formed will later be rehabilitated into recreation area similar to nearby Wayne Lakes Park

HISTORY

gravel out of the roadside-pit category and into its rightful status as a manufacturing industry producing products of high standards to meet the demands of quality specifications. He has had extraordinary vision and has built an organization that has been far in the van of the industry in its approach to the production of aggregates, in merchandising and in the anticipation of trends vital to the industry. Soundness of his ideas is proved by the fact that many concerns are now putting into practice principles that have long been practiced with success by the American Aggregates Corp.

Accordingly, we dedicate a considerable part of this issue of *Rock Products* to the history and development of the company and to a consideration of its present status, its production facilities, and business philosophy. Mr. Coppock's attributes and his views are considered in a separate article in this issue and, because of the intense interest in zoning and land rehabilitation to the rock products industries at this time, the company's activities in land reclamation are discussed in a third article.

Only in the last few years has the aggregates industry as a whole become seriously concerned with zoning laws and the need for reclamation of worked over deposits, but to American Aggregates, land rehabilitation has been established policy for years. It was 20 years ago that the company undertook development of a recreation area at the site of its first plant near Greenville and by so doing pioneered an activity that had better be given serious attention by all industries that extract minerals from surface deposits.

History

Start of the business was with Mr. Coppock himself who was a laborer in his first operation, which was at Ludlow Falls, Ohio. Screening was done by hand and bank-run material was loaded into railroad cars by plank and wheelbarrow at the rate of one 50-ton car per day. Selling price was 25¢ per ton.

After nearly two years, 20 acres of gravel lands were leased at Fort Jefferson, six miles south of Greenville. Later, an old estate consisting of 650 acres of adjoining gravel lands, mostly covered with hardwood timber, was purchased. A saw mill was first set up to cut lumber and then operations were started to get out sand and gravel.

The deposit was a tough one to work since it consisted of a series of ridges containing gravel and necessitated much moving about. As many as 35 men were employed to operate wheelbarrows and the tonnage increased to as high as 35 cars a day of bank-run gravel. Volume of business gradually increased to the point where mechanical methods were neces-



Bituminous mining plant of Fenton Construction Co., operated in conjunction with Urbana, Ohio, aggregates plant. Similar heavy tonnages are moved at the various plants



Urbana, Ohio, plant was recently rebuilt. Note provisions for large storage of finished products arranged in a row, and stacking conveyor



This photograph of Columbus plant shows practice of stockpiling finished products in piles over a reclaiming tunnel conveyor. In foreground may be seen trestle over which pit-run material is delivered into a surge pile (left foreground)

HISTORY



Detroit distributing yard has central mixing plant for the accommodation of customers' trucks. Large tonnages of aggregates, as produced at Oxford and Brighton plants, are moved through this plant



Oxford, Mich., plant is the largest operation of the company and one of the best-equipped in the United States to produce multiple products meeting diversified specifications



This portable field hopper is typical of conventional practice in dry pit operations. Discharge is by pneumatically-operated gates into large ore cars hauled over standard gauge rails by diesel locomotive. Use of hopper permits uninterrupted operation of dragline

sitated. A partnership was formed, consisting of F. D. Coppock, J. F. Coppock, J. M. Miles, W. O. Patty and William Patty. A 1½-cu. yd. Marion steam shovel was bought in 1908 for loading bank-run material. That machine is said to have been the fifth built by Marion and served as a "laboratory" in actual operation toward the further development of steam shovels for use by the industry.

Then followed a period of heavy demand for bank-run gravel to build roads in Paulding county, Mercer county, and in the northern part of Darke county within which the deposit was located. Trainloads of material were required and steps were then taken to build a small washing, crushing and screening plant at Fort Jefferson. The varying condition of the deposit and a demand for clean, sized aggregates was developing. This plant was one of the first in the United States set up to produce such aggregates.

A trunnion screen, manufactured by C. O. Bartlett & Snow Co., Cleveland, for other use, was installed in the plant and was one of the first revolving screens used in the sand and gravel industry. Equipment in the plant included Gates crushers, trommels and roll crusher, and haulage was done by 10- and 12-ton dinkies operating on 26-gauge rails. Excavation was done to the water line by steam shovel and, later, dredging was employed for excavation 20 to 25 ft. below the water level. The deposit was a rambling ridge of glacial gravel and a total depth of 115 ft. of gravel was available for excavation. Then, the practice of desanding the pit-run material was developed, in order to deliver a proper balance of the sand and the gravel to the plant. That practice is still followed in plants of the company today.

The Greenville Gravel Co. was incorporated in 1911. The first plant was built at Fort Jefferson in 1912 and the second at Weaver's station in 1913. In 1914, a plant was built at Mechanicsburg, Ohio, to supply a contract for railroad ballast to the Cleveland, Cincinnati, Chicago and St. Louis railroad. A plant was also built during that year at Ackerman Lake, Mich. Then followed the purchase and leasing of deposits strategically located with respect to railroads, and other needed facilities, throughout Ohio, Indiana and Michigan. The plants that were built, in each case, were incorporated as separate companies. Up until about 1925, plants had been built at Kalamazoo, Mich.; Massillon, Ohio; Richmond, Ind.; Logansport, Ind.; Urbana, Ohio; and Brighton, Mich. Valuable property in Columbus, Ohio, was acquired in 1925 and 1926 at locations where large plants were to be built later. All the separate companies were incorporated, in 1927, into the Greenville

HISTORY

Gravel Corp. with a capitalization of \$1,250,000 in preferred stock and \$2,500,000 in common stock. American Aggregates Corp. was incorporated in 1928, and at that time, annual production capacity of the corporation was approximately 9 million tons.

On February 1, 1928, \$2 million of 15-yr., 6 percent sinking fund gold debentures were issued, to mature on February 1, 1943. The bonds were fully liquidated on schedule and there now are no bonds outstanding.

Most of the plants built before the 1930's originally were designed to produce railroad ballast but they were built with a view toward the growing trend in demand for clean, processed aggregate as required for the construction industry. At the time the American Aggregates Corp. was incorporated, diversified markets for aggregates were developing, and operations were being adapted for flexibility in order to balance production according to changing demands. In 1928, some 30 percent of production was of railroad ballast, 40 percent was sold to the state, city and other political subdivisions for road-building, and 16 percent for structural concrete. The balance went into miscellaneous uses.

During the 1920's, widely scattered deposits had been acquired in strategic locations, in each case after careful study of overburden, depth and extent of deposits, marketing possibilities and all the factors that must be carefully considered in the decision to establish plants. Truck transportation had not developed considerably and all plants were established on railroad lines with switching facilities.

The company had become a specialist in the sand and gravel business and, during its period of rapid growth, developed many production methods that were new then but which now have come into general use in the industry. By virtue of its size the company was able to employ the best in administrative, merchandising and engineering talent and was able to profit from the advantages that any large scale producer has over smaller competitors, in establishing a fair price and depending upon a large volume of sales at a low margin of

Accordingly, a separate organization, the Greenville Manufacturing Works, had been established in Greenville for repair and maintenance work and for the design and manufacture of much of the company's own equipment requirements. This activity was expanded and the company branched out to manufacture equipment for sale and became active in the design of plants for other concerns. The late Frank M. Welch, who had a national reputation as an outstanding designing engineer for sand and gravel plants, supervised the construction of plants of the company until the time of his death.

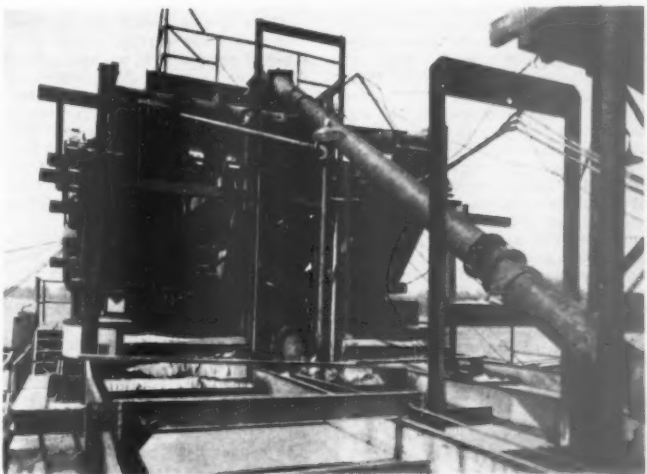
Certain of the original operations



Equipment of contracting subsidiary, dredging channel in Illinois river near Peoria, Ill.



Pit operation at Oxford, Mich., plant. Draglines are of 5-cu. yd. capacity and load to field hoppers from which cars are filled for haulage over standard gauge rail to plant



This dredge made history at the time, several years ago, when these screens effected separation at 30 mesh in the production of concrete sand

HISTORY



This plant, in South Columbus, Ohio, as photographed several years back, shows how railroad cars and stacking conveyors from track hoppers are sometimes used to extend storage areas over tunnel reclaiming belt

have been discontinued due to depletion of deposits but policy has always been to establish new operations to compensate for loss in tonnage. The corporation's belief is that expansion should be stressed in order to be able to produce quality products at still lower costs and to render the best in service.

At the close of 1949, the company was producing sand and gravel at Oxford, Mich.; Brighton, Mich.; Columbus, Ohio (plants A and C); Urbana, Ohio; Indianapolis, Ind.; Richmond, Ind.; Kalamazoo, Mich.; Dayton, Ohio; Fort Jefferson, Ohio; and Logansport, Ind. Sand, gravel and slag were also being produced by an affiliated company, American Materials Corp., at Hamilton, Ohio. Total sale of aggregates was a little over 7 million tons in 1950. Potential plant capacity is 10 million tons annually.

Total acreage of gravel lands owned is approximately 5000 acres and total acreage of gravel lands leased is approximately 2000 acres. A plant at Dayton, recently acquired from Price Bros., is in the process of extensive rebuilding and enlargement. The Urbana plant was rebuilt during 1949, the pit operation at Brighton, Mich., was revamped and work was in process in the reconstruction of plant C at Columbus. During the past two years, large investments have been made in the acquisition of gravel property to assure reserves for the future, in recognition of the trend in zoning laws toward restricting the uses which may be made of land.

The plants vary considerably in size. Those at Oxford, Mich., and Brighton, Mich., are the largest and supply the Detroit market, where the company maintains large distributing facilities. The Oxford plant normally produces more than 20 percent of total tonnage and is one of the largest commercial plants of its kind, being equipped to produce all manner of diverse specifications including a variety re-

quiring various percentages of crushed particles. It is heavily equipped with crushers and vibrating screens, for a gravel plant, and it isn't uncommon to ship 50,000 tons or more in a single week from the plant. Most of the plants are dry pit operations but dredges are employed at several locations.

All plants are equipped to produce a wide variety of sizes and products, and the company's policy has always been not to resist tightened specifications but to meet them if at all practicable. In fact, it might be said that the company has contributed to the development of "percentage crushed" ballast specifications through its ability and desire to improve performance of ballast in service. Most of the plants were built to produce ballast but more than 75 percent of the total tonnage is now of commercial aggregates.

There is considerable standardization among the various plants, as to types of equipment in use and general design, and some of the practices, of many years, are now gaining recognition generally by the aggregates industries. Some of the plants have been described individually in articles published from time to time in *ROCK PRODUCTS* so we merely touch upon highlights of standardized practices herein.

In the excavation, practice is to use large capacity equipment as a means to economical operation. For dry pit operation, the preference is to electric draglines, for example, with 5-cu. yd. buckets even at the plants of relatively modest size. Another practice is to use field hoppers in order to enable continuous operation of the dragline. The standard is a 90- or 100-ton portable hopper with sloping grizzly superimposed to reject boulders. The hopper has pneumatic discharge gates.

Another standard practice is to use diesel-electric locomotives to haul

large capacity, bottom-dump ore cars on standard gauge rail from the pit to the plant. Each locomotive has a 500-hp. diesel-electric unit and the train is from two to five cars carrying 40-50 tons each. Discharge is through a trestle into a large reserve storage pile.

It is believed that American Aggregates Corp. can be credited with being the first sand and gravel producer to use, as basic design, storage of finished products over tunnel belt conveyors for withdrawal in loading and for blending materials. All of the plants are designed on this principle. Surge piles of unprocessed material are another feature of the plants in order to maintain the crushing and screening plants uniformly loaded at a high rate of capacity independent of pit operation. The practice of having surge piles was in use in these plants long before it became a trend in the industry.

Tunnel conveyors are designed for natural drainage when practicable, otherwise sump pumps are provided. The newer ones are built with the tunnels open at both ends for ventilation, to improve working conditions. Quadrant-type gates of special design are used to seal against leakage. Stacking conveyors from the screening plant are used extensively to stockpile excesses over bin capacities.

Of particular interest is the manner of using storage piles in connection with the production of sand. Practice is to wet-screen sand into three sizes. A $\frac{1}{4}$ - to $\frac{3}{16}$ -in. fraction is produced and stockpiled, and a $\frac{3}{16}$ -in. to 10-mesh intermediate size is screened and also stockpiled. Minus 10-mesh material is processed through either sand drags or Dorr-type bowl classifiers and then stockpiled.

Minus 1/10-in. product is masons sand, and concrete sand is produced by interblending the separate fractions on the tunnel conveyor belt. The

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coarse sand is first put on the belt and then the finer sizes, the mixing being accomplished on the belt and in the transfer between belts in series and through handling into a blending bin from which the sand is loaded. Two stockpiles of 1/10-in. sand are built, to permit drainage from one pile while drawing off from the other.

The advantages gained by stockpiling the raw materials as well as the several sizes of aggregates and sand are that they have divorced the field operations from the plant operations, also the plant operation from current trade demand, eliminating delays which would otherwise be occasioned by each unit of operation depending on the other.

American Aggregates Corp. has pioneered the practice of desanding and processing through separate sand plants at each location as a means to remove excess sand at most locations, and in order to balance production and, more importantly, to increase the capacity to screen and crush the gravel. Separate production of gravel is a means of greatly increasing its production and lowering costs, sand production being the bottleneck to a combined operation. Another important reason is to facilitate the disposal of excess sand in the pit rather than permit its accumulation around the plant.

Rotary-type screens, with scrubbing sections, are preferred in the plants where there is clay contamination, prior to passage over sizing vibrating screens. Bucket elevators are used extensively to elevate the products of crushers back over sizing screens. All elevators and main conveyors are equipped with automatic backstops. Some of the plants, where market conditions require, at Urbana, Hamilton, and at the Detroit distributing plant, have weigh batchers for special service to truckers. The newest and an original development will be the employment of dredges with tremendous capacities at two of the locations carrying a great excess in fines in order to effect sufficiently low costs to justify operation for a small percentage of gravel. The operation will be a parallel in theory to the use of gold dredges in California which are among the lowest cost operations ever designed for handling vast tonnage of bulk materials.

Diversification has always been part of company policy and the company operates the following divisions:

Greenville Manufacturing Works, Greenville, Ohio.

Implement Division, Greenville, Ohio.

Wayne Lakes, Fort Jefferson, Ohio.

Scioto Lakes, Columbus, Ohio.

Ready-Mix Concrete Service.

Asphaltic Concrete Service.

The Wayne Lakes and Scioto Lakes divisions are recreational areas developed by the company at Fort Jefferson

and at Columbus as a result of reclamation, and are company-owned operations.

Among subsidiary and affiliated companies are:

Allied Cloth Specialties, Greenville, Ohio.

Grant Contracting Co., Greenville, Ohio.

American Materials Corp. (slag and gravel plants), Hamilton, Ohio.

Brown-Huffletter Material Co., Indianapolis, Ind.

Permacrete Products Corp.

The latter subsidiary operates plants at Greenville, Ohio; Columbus, Ohio and Chicago, Ill., in the production of precast concrete specialties. Principal products are concrete burial vaults, concrete interlocking houses, concrete highway slabs, corflor units, posts and markers for sale to the railroads.

The company's contracting division is actively engaged in the dredging of inland waterways. At present, principal activity is in dredging for the Army Corps of Engineers on the Illinois river. Other projects in the past have been for the T.V.A. and in connection with other government waterway projects. During the past war, the company was in position, through its diversified operations, to undertake sizable war contracts. Among them was the manufacture of protective canvas specialty products for use in a number of applications by the fighting forces overseas.

Officers

Fred Coppock continues, after 50 years, to be extremely active in the conduct of all phases of the company business. His thinking is reflected in the design of all plants, and in the modernization programs undertaken. As an operating man, his judgment is based, not so much on education as an practical experience, and is so recognized that he has been called upon by outside organizations for advice

and consultation on many production problems. He was one of the experts called upon for recommendations in development of program to produce aggregates for Grand Coulee dam.

Mr. Coppock is extremely civic-minded and has been the moving force in a planned program for rehabilitation of worked-over areas and the creation of recreation centers to benefit the public. The "real estate" phases of the business are his special interest and a new and enlarged program of reclamation is in process at all plants under his general direction.

He has, in addition, contributed much to the local community. He has donated the land for Treat Memorial Park in Greenville at his own personal and company expense, for use of the community and for state-wide Boy Scout outings. He and Mrs. Coppock have jointly donated a Girl Scout camp, and it was through Mr. Coppock's insistence that the Greenville Country Club was built.

Guy C. Baker, secretary, has been associated with Mr. Coppock almost since the beginning and it was he who developed the sales organization and the selling methods in effect. Wm. Edward Hole is executive vice-president and legal counsel of the Company. Mr. Hole is currently chairman of the committee on zoning and land rehabilitation of the National Sand and Gravel Association. J. C. Patty, vice-president and chief engineer also is purchasing agent and is actively interested in civic affairs.

Messrs. Coppock, Baker and Patty comprise the executive committee, and the board of directors, in addition to the executive committee, includes Mr. Hole, M. G. Kerr, F. H. Grant, and C. E. Glander. District offices are maintained at Columbus, Ohio; Indianapolis, Ind., and Detroit, Mich., under the direction of Messrs. Glander, Grant and Kerr respectively, who are district managers in their respective states.

The President of American Aggregates Corporation

By NATHAN C. ROCKWOOD

IT IS NO ACCIDENT or incident that Fred D. Coppock is president of the largest sand and gravel producing organization. For a half century his life has been devoted to building up and adding to that organization; to making sand and gravel production big business. Probably no other industry executive has a more thorough knowledge of and a keener insight into every detail of sand and gravel production and merchandising.

F. D. Coppock was born of Quaker parentage on a farm near Ludlow Falls, Miami County, Ohio. He ex-

perienced his first handling of gravel when at the age of 16 he shoveled bank-run gravel onto flat-bottom, horse-drawn wagons, filling the required contribution of two days' work for poll tax. At that time, needless to say, sand and gravel production was a small neglected industry. In the succeeding half century he has demonstrated, above all else, the capacity of his own organization to grow at least as fast as the industry grew in productive capacity and in prestige.

Aside from an unusual amount of native common sense, executive ability

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and human understanding, we would attribute his success to single-minded devotion to solving the problems of his own business, to unflinching faith in its future, to an incurable optimism and desire for growth . . . in capacity, in efficiency, in profits. We have been told that Fred Coppock has often been just plain lucky, but one does not have luck good or bad, unless he takes risks. Probably no other executive has ever made a more objective study of his own job, or been more modest in his appraisal of it. Typical of the man, this is undoubtedly motivated by the practical self-consciousness that he can not last forever, and that another must succeed him; his greatest desire is obviously that the organization shall continue to grow and profit when he is no longer there to guide it.

At a recent dinner given by his associates and employees of many years standing, to pay appropriate honor to his 50 years in industry, the commemorative card carried the familiar quotation: "An organization is the lengthened shadow of a single man." This is certainly as true in this instance as any that could possibly be found. But, when it came time for him to reply to all the complimentary things said there, and to accept the gift of a very fine wrist watch, his first reaction was to protest, sincerely and eloquently, that no organization

ever "was the lengthened shadow of a single man," but the product of the cooperative efforts, talents and abilities of many men of various qualities. He has stated emphatically that a single man without the cooperation and loyalty of his associates would get nowhere, and that "an organization is the lengthened shadow of the loyalty, cooperation and labor of the men with whom he has built an organization." That also, of course, is true, but the modesty of this man would not permit him to acknowledge to himself that it does require a very special kind of ability or genius to be able to coordinate these varied talents and abilities and efforts of men of different calibers to achieve successful cooperative results.

A Doer Not a Talker

Although one of the original members of the National Sand and Gravel Association, and a staunch member ever since, he never would accept office other than as a director. He has never been a very regular attendant at the annual conventions. Hence, Fred Coppock is not personally well known to many present-day producers. This, we feel certain, is true to character. Those who do know him well, know that his outstanding characteristic is sincere modesty regarding his achievements or his real prominence in the industry. His mind is

ever busy with practical problems concerning his own business. We believe that he finds it difficult to listen to talks on generalities, which have no particular interest of value to him. He is famous for solving his operating problems in original ways. He is of the opinion that success in business depends largely on the ability of a person to engage in contrary practices; the ability to do things differently and better, away from the competitive situations which go hand in hand with the following of established methods. On the other hand he approves other members of the organization attending all convention sessions. Moreover, whenever there has been special need to draw upon his vast fund of special knowledge and experience, he has been ever ready to contribute for the benefit of the industry. To any and all producers who seek his advice or desire to inspect his operations, he has always been hospitable and helpful.

In 1918, in the midst of World War I, when the sand and gravel industry was being pushed around by unappreciative government agencies, Fred Coppock helped greatly, serving actively on the board of directors of the Ohio Sand and Gravel Association and on War Committees for the National Association. At the end of the war, producers were faced with an attempt by the Government-operated



Dinner on December 7, 1950, commemorating President Fred D. Coppock's 50th year in the sand and gravel industry. Managers of all plants, officers, department managers and invited guests were in attendance.



Left to right are M. D. Kerr, manager of Michigan operations, who delivered the principal address at dinner honoring Mr. Coppock; Guy C. Baker, secretary, who presented Mr. Coppock with platinum wrist watch; Mr. Coppock, and William Edward Hole, executive vice-president of the company, who was toastmaster

railroads to make an unprecedented and unjustified general increase in freight rates on sand, gravel and crushed stone. In opposing this Fred Coppock's large experience and comprehensive knowledge of the industry and its markets were invaluable to the organized industry.

In 1920, when a shortage of labor, or the kind of labor that would work in gravel pits and quarries, had developed, Fred Coppock wrote a paper, that was read to the National Sand and Gravel Association in convention at Chicago, which presented views and personal convictions at least 20 years ahead of his time. Perhaps that was one reason why at subsequent conventions he did not contribute more. He must quickly have realized that it is far simpler to go ahead on his own, and do things, than to attempt to persuade his contemporaries to do something similar. Some few quotations from that paper (*ROCK PRODUCTS*, Feb. 14, 1920, p. 39) might have been made in 1950, when their significance would have been much more generally appreciated.

Advanced Views on Labor

Mr. Coppock wrote: "The views which I express in this are the result of my convictions formed during the past 17 years of constant contact with labor, and from different positions, as laborer, as foreman, superintendent, and finally as an employer.

"I believe that the great army of employers in this country, regardless of the number of men they employ, and the nature of the labor to be performed, will soon realize the necessity of greater industrial democracy. The

absence of democratic ideas, the absence of personal consideration, the lack of contact and interest in the simple everyday affairs of the employed, the social distinction exacted by the employer, are labor's excuses for lack of interest in the affairs of the employer. It must be obvious, therefore, that the responsibility for the resulting dissatisfaction and unrest falls on the employer. It is natural that if we treat laborers as mere tools without any interest in their personal affairs, they in turn will treat us as a machine, and without any personal interest in our affairs."

We wish we had space to quote some more, for while the paper is brief, it is full of similar homespun advice of the successful handling of labor, which is at last being generally understood, even if not yet generally practiced. There was special emphasis on the value of personal contact and personal interest in each and every employee. Recently, Mr. Coppock, in a conversation with the writer, said that it required no special effort on his part to show a personal interest in his individual employees, for his interest in them and their affairs was genuine, most of them having been with him for many years. And, moreover, such interest has to be genuine for few workmen are so dull as not to be able to distinguish the real from the phoney. Which means, of course, and it is demonstrated in this instance, that not every man has the gift of genuine human sympathy and understanding. Indeed, it is our experience that it is a rare gift.

With that background it is not surprising that the president of the

Greenville Gravel Co., and its successor, the American Aggregates Corporation, has never had any "labor trouble." The only unions that the corporation has had to deal with are those which it persuaded some of the employees to join, rather unwillingly, because it was embarrassing some construction contractors in a few localities to use non-union produced materials. It is plain to anyone who observes Fred Coppock in action that he is ever conscientious in regard to the welfare of his employees.

What Makes an Executive?

At the anniversary dinner he spoke as one thinking deeply about the requisites of an executive. He said that the older he became and the more he thought about it, the less sure he was of being able to put his finger on just what qualities to look for. It was not mere technical knowledge, or common sense, or human understanding; probably it included these and more, but above all, the willingness to make decisions, knowing that some of these decisions must be considered harsh by those who could not understand. Nevertheless, such decisions must be made by some one. It was all too evident that it has always been hard for one with such a gift for human sympathy as Fred Coppock to make that kind of decision. Only an unerring understanding of what is to be done for the good of the organization could lead to such a decision. We have often wondered how often sentiment in one form or another has kept a man in a job for which he was fundamentally unsuited, at the expense of the best for an organization. This is a real

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test of an executive. Evidently that was what Fred Coppock had in mind that evening.

Opportunities for Youth

In 1939, when the outlook for young men in these industries looked particularly dark, we asked a few of our business executive friends for their views on opportunities in these industries. One of these "Guest Editorials" was by Fred Coppock (March, 1940, p. 28). We think this also throws considerable light on his business philosophy. A few extracts follow:

"You ask whether or not a man's starting as a laborer would, in our opinion, cut him off from opportunity of becoming an executive. Your question is somewhat to the contrary of our experience. Most of the problems associated with the production of aggregates are not of such a technical nature that highly educated supervision is essential. A knowledge of mechanical operations, a sympathy for and understanding of labor, an inborn leadership of men, coupled with good common sense, are in my opinion,

more immediate requisites for the management of gravel operations than technical training.

"Technical men and technical advice can usually be employed . . . while the qualities which go to make up a plant manager are difficult to find in a single individual. Please understand that I do not mean to say that a college man is not well suited to be a manager. In my opinion he has a decided advantage, provided he is by nature fitted with the other essential qualities. Based on my own experience, I find that few college men are willing to do things and make the necessary sacrifices in order to acquire a practical training. Too often, college men as managers must depend on the judgment, knowledge and honesty of the men under them, and to that extent they are put to a disadvantage. The manager should know from experience what to expect of each man under his direction. He should have some knowledge from experience of what to expect from the various mechanical devices used in the operations, and how to arrange and maintain them. * * * * The work is

rough. The men need to be rugged . . . not afraid of grease and grime and not ashamed of soiled hands and clothes. Most of these conditions are objected to by the highly educated, polished college graduate. It is difficult and often impossible for college or technically-minded men to fit themselves comfortably into such surroundings. Their educational efforts have been for the purpose of avoiding such things."

More recently he said that their polished surroundings during their college training is apt to cultivate in them an intolerance for the common things and the common laborer which he involuntarily radiates.

We think these last are sentences probably less true today when many of our recent engineering graduates are ex-GI's whose military experience probably helped in overcoming those special obstacles; probably Fred Coppock would readily agree to this deduction. The quotation is included only because it is evidence of his firm belief that the way to succeed in the sand and gravel industry is to know it from the ground up.

Reclamation

A Planned Program for Land Rehabilitation

American Aggregates Corp. creating recreation areas, homesites and industrial real estate in connection with sand and gravel plant operations

By BROR NORDBERG

DURING THIS PAST YEAR an increasingly large number of cases have come up wherein efforts have been made to restrict operations of sand and gravel and crushed stone producers. There is an increasing threat to the continuance of operations through efforts to apply zoning regulations which would either prohibit the extension of operations, the relocation of plants, the establishment of new ones or which would dictate "acceptable" methods of operation. Existing plant operations, in some cases, must be defended in order that they might survive.

In most instances objections have been voiced to the existence of plants in certain areas which have been alleged to be nuisance industries. In metropolitan areas which are expanding with population growth, the uses to which land might be put are being carefully evaluated by zoning bodies, but there now is a rapid spread in the development of rural zoning regulations that constitutes a serious threat to future plant operations.

Complaints against a plant operation are often unjustified but, on the other hand, there have been cases of dereliction on the part of the industry which have placed it on the defensive. Unsightly plants, hazardous conditions that are allowed to exist around plants, noise, dust, traffic congestion, discourteous drivers, indifference to the rights of adjoining property owners and marring of the country-side are practices that have contributed to the wave of criticism. As a matter of self defense, the industry is faced with the necessity of correcting its derelictions where they exist, and concentrating on good public relations, or laws that will prove impractical and uneconomic are likely to be enacted. The need for land reclamation and the rehabilitation of devastated lands into property of utility is becoming particularly serious.

American Aggregates Corp. is a

pioneer in the field of land reclamation, and its experiences and activities in making recreation areas and valuable real estate from worked-over deposits could be a valuable guide to other concerns which contemplate a program of property improvement. The company started its program 20 years ago at a time when there was no threat of restrictions requiring reclamation. A large area of land had been depleted at Fort Jefferson and because of the unsightliness of the property the company considered it its obligation to take voluntary steps toward a plan of improvement.

The deposit at Fort Jefferson, Ohio, consisted of numerous ridges of gravel which had been excavated. There had been an excess of sand which was pumped into the deep pits resulting from excavation. Subsequently, the area had grown up with brush and shrubs and had taken on the appearance of a wilderness. Draglines in non-operating seasons were moved in, as was a dredge pump on a raft, to reshape the topography and to build

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beaches. Thousands of trees were then planted and the land was seeded, in the creation of a recreation area which now is among the finest anywhere, and is known as Wayne Lakes Park.

Wayne Lakes Park is set up as a non-profit organization, owned by the company, and is entirely self-supporting. Scioto Lakes is another development, in Columbus, owned and operated along a similar plan.

The company is in the midst of a program of land rehabilitation at all the 12 plant locations. The type of development at each location is, of course, determined by local conditions. At Oxford, Mich., the creation of a recreation area is being made in the anticipation of selling lots for homes. In another area, the program involves filling in of depleted areas and the creation of property for the establishment of industry. Property in or adjacent to larger cities is being developed into lots for sale and, in some cases, ownership will be retained. In rural areas, concentration is on park development and rehabilitation into farm land.

Rehabilitation is considered an obligation to each neighboring community. Work toward reclamation is mostly done during non-plant operating periods at the various locations and stripping is done to a definite established pattern and rough grading progresses as the operation is extended. As a general pattern, the faces of dry pits are graded to slopes which will permit use of a power mower. Pit areas are levelled and rocks protruding in the bottoms of pits are covered. Strippings or top-soil is spread over areas where it is desired to plant soil-binding crops and for the planting of seed in the creation of grazing land. Planting of shrubs and trees is an essential part of the program. The company seeks the guidance and cooperation of the various state agricultural and conservation departments and of the federal government in planning its operations.

In its overall program, the company's principal objective is to accomplish a commendable job of reclamation at all plant locations as an important contribution to improved public relations. The first project, Wayne Lakes Park, and Scioto Lakes at Columbus, Ohio, have proved that a properly set-up recreation area can pay its way through incoming revenue paid for membership and recreational privileges. It is anticipated that income will equal the costs.

Costs of reclamation on the basis of tons of aggregate produced vary according to the capacity of the operation and the amount of reclaimable pay material and its depth. According to the experience of the American Aggregates Corp., the additional cost is insubstantial if the objective is only to improve the appearance of the



One of 18 lakes in Wayne Lakes Park development. The deposit originally worked consisted of gravel hills, which reflect in the pattern of the recreation park.

property and if reclamation is planned and accomplished as part of the normal plant operation. For a typical commercial plant in the 200,000-300,000 annual tonnage range, the extra cost for a planned and continuing reclamation program should be very little as only such materials are used as must be disposed of somewhere and often little or no extra cost is required.

Wayne Lakes Park

Wayne Lakes Park is an area of more than 700 acres located six miles south of Greenville just off state highway 121. Due to the fact that gravel

occurred in a series of rambling ridges, the reclamation program created 18 small lakes within the area. The development was incorporated as a non-profit association and has a club membership reasonably controlled for the protection of its membership, with guest privileges available for non-members on a fee basis. Limited memberships are also available. Members are licensed to rent land and are permitted to build cottages according to specifications as outlined in the rules and regulations. A board of governors, consisting of nine members, is elected by the club members, who hold annual meetings, and the board elects a chair-



View of several man-made lakes in Wayne Lakes Park development, made from a worked-out gravel deposit. Entire area was reforested and seeded and 18 lakes are kept stocked with fish.



Plot of Wayne Lakes Park development area of the American Aggregates Corp., Greenville, Ohio

man, vice-chairman and secretary to pass on new members, to establish rules and regulations and handle the conduct of other association matters.

Management of the American Aggregates Corp. reserves the right, subject to the established rules and regulations, to control the property, establish rules of conduct and to pass on the regulations governing construction practices. Land for the construction of homes is leased on five year terms subject to renewal and the homes cannot be sold except to club members. At present there are 460

families represented in the membership and 156 cottages have been built of which some are year-round residences.

Facilities include fishing, boating, swimming and picnicking. A fish hatchery is operated and the lakes are well-stocked with game and pan-fish. Recently, a new 40- x 80-ft. community building was completed and it was financed out of dues assessed. The property has a resident manager who is employed by American Aggregates Corp. The scene shown on the cover of this issue gives an idea

of the extent to which the company has gone to provide recreation for the area.

Columbus

At Columbus, Ohio, the company has an operation at Dublin Rd. on the main route to Cleveland and also has a plant on the south side of the city where the excavation has already been transformed into picturesque Scioto Lakes and its Scioto Lakes Fishing Club. Dredging is still in progress in the area and more work in reclamation remains to be done.

Reclamation work now in progress at the Dublin Road plant which is being accomplished by the proper disposal of strippings and waste materials from the operations, will transform the area into a residential section with a part set aside for commercial purposes and light manufacturing. Excavation is progressing at both ends in development of a lake that will be 1½ miles in length and 800-1000 ft. in maximum width. Frontage on the Dublin Rd. side of the lake is being subdivided for commercial buildings and industry and it is restricted so that buildings must be at least 100 ft. apart and 70 ft. from the road.

Piles of overburden have been removed from one end of the lake and the ground has been graded, contoured and grass has been planted. As dredging continues and the strippings need to be disposed of, grading follows behind as continuing rehabilitation. Facing over the lake toward Dublin Rd., there may be at some future time a residential section.



Here a dragline is rough-grading shore line in anticipation of seeding and creation of a recreation area. Company practice is to do this type of work in connection with program of operations in production of aggregates

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When completed it will be a complement to the surrounding highly developed neighborhood. This site contains 310 acres and will be built along a pattern similar to Wayne Lakes.

Oxford

A program has been started at Oxford, Mich., north of Detroit in developing a property with a lake containing 17,000 ft. of shoreline. The shore is being smoothed back with an inclination of 1 ft. in 5 ft. strippings and soil are being placed and trees are being planted. When finished, this property will be a recreational area with a man-made lake right in an area famous for its many natural lakes.

A club will be established. Rigid restrictions will have to be complied with. New members will have to be approved by the membership committee before they can join the club. Grading is now in progress. Bathing beaches, boat docks and good fishing will be part of the development program, and the project will be put in charge of a manager. The company feels confident it will be able to realize a self-supporting recreational area which will also be a complement to the surrounding territory and a sign of the corporation's public interest.

In Indianapolis the property is on Richmond St. in the heart of an industrial district so there is no opportunity for development of a recreation area. Accordingly, an arrangement was made with the city whereby excess fines, accumulated over the years, and trash will be used for fill in the development of industrial property. Dredges have been employed in non-operating periods to fill the land.

At Urbana, the company had in the past been operating on leased properties. In the course of the years, a lake was created that has been adapted into an excellent beach for swimming, now operated by the lessor. The company now has its own property at Urbana and is handling the stripping so as to provide a proper sphere condition around the large water areas which will be created. Rough grading

is going forward as excavation progresses, with the ultimate objective of providing a proper lake.

The Dayton property was recently acquired and a plant expansion program is now underway. A portion of the land is not owned but the company is relocating the course of the Mad River in the area with the view of creating a beautiful city and conservation district water area. Levees are being erected out of strippings to protect nearby residents from floods. Accumulated strippings from the former operation are being levelled off and filling is in progress.

At Richmond, Ind., there is a wet pit operation as well as a dry pit. In the dry pit area, bulldozers and draglines are to be moved in during non-operating periods to reduce the accumulated piles of strip overburden and to establish grades for sowing grass. There will be re-forestation and the planting of soil-building crops. The wet pit section will be converted into a recreation area. Operations have been suspended at Logansport, Ind., but money is being invested in grading the property around a lake for recreation purposes, even though the property is privately owned and only leased by the corporation.

In the foregoing, we have outlined definite plans in the established policy of the American Aggregates Corp. The company has done far more than any other concern in the industry as far as a planned program for land rehabilitation is concerned. The company continues to invest heavily in new property because of the recent turn in the development of zoning regulations. In recently securing an amendment to a zoning ordinance after great difficulty, for the purpose of re-establishing a sand and gravel plant in Marion county, Ind., the company has recently run into serious regulations which may be the forerunner of more like them in the state. Besides serious and definite restrictions to operation and explicit requirements for contouring, planting, etc., a 5-yr. permit was drawn up and

the posting of a surety bond was required to guarantee compliance with the required program of rehabilitation. It was with much difficulty that an agreement was reached providing for automatic renewal of the 5-yr. permit six months ahead of expiration on the condition that there was not a judicial determination that the company had failed to comply with all the regulations of the permit.

The plan of reclamation and reconditioning required by the Marion County Zoning Board was virtually the same as the unrequired plan of reclamation work that has been carried on by the American Aggregates Corp. during the past several years. Without the company's established reputation for land rehabilitation at other locations, it is doubtful if the concession of the renewal of the permit would have been granted.

American Aggregates Corp. recently undertook to procure about 500 acres of sand and gravel land in the Detroit area. The company secured options, drilled several test wells and was ready to go ahead with the purchase of the land, when a petition was circulated, asking the local zoning board to prevent the operation. The 500 acres were farm land and adjoining gravel properties being operated by other gravel companies. Large areas had already been excavated but no attempt had been made to reclaim or recondition the worked-over areas. Therefore, the neighbors justifiably considered the gravel operations as detrimental to their properties and the neighborhood as a whole. A large meeting of the land owners was arranged before the zoning board, but despite the promise of American Aggregates Corp. to do a thorough job of reclamation, and its willingness to agree to such a plan in writing, the petition was denied and the effort to secure the property was stopped.

Therefore, public relations through sound practices and a plan of reclamation appear to be essential in order to protect and continue the industry.

Group Bargaining

NATIONAL INDUSTRIAL SAND ASSOCIATION in a memorandum sent to association members summarized a recent decision of the National Labor Relations Board which affects the status of employer group bargaining as follows: "The Morand decision puts employer group bargaining in a difficult position. It certainly forbids outright discharge by an employer group to counter a piecemeal strike, in the absence of other factors. But it is very likely still possible for a group of employers (having some background of group bargaining) to lay off their employees in case of a strike against a single employer or small number of

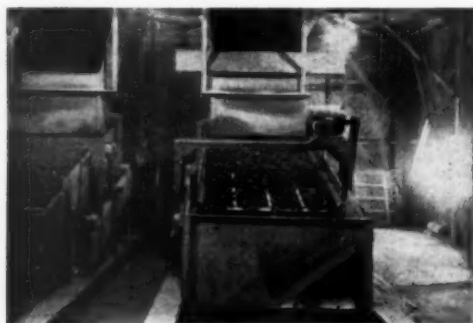
employers. And it still may be possible for the employer group to protect itself by an advance agreement with the union or by getting board certification."

The memorandum warned employers, in case of a negotiations breakdown, or strike, not to act abruptly, but to proceed slowly and take steps to make clear that the door is always open for further bargaining on a group basis. Also, employers were cautioned to distinguish between lay offs and discharges whenever a group of employers shut down their operations because of a union effort to drive a wedge in their ranks. Judging by recent decisions of the Labor Relations Board, a mere lay off—clearly

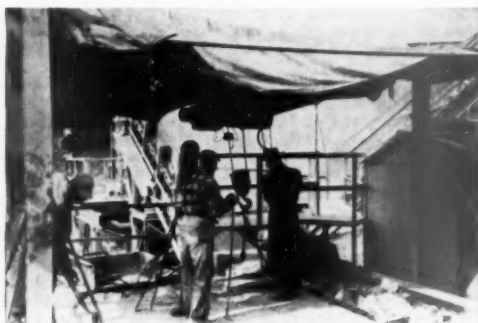
identified as such—would be far less likely to be found unlawful than an outright discharge.

To Install Distributing Plant

PLANS FOR A \$100,000 DEVELOPMENT on the banks of the Willamette river near Milwaukie, Ore., have been announced by Howard Puaria of Seattle, Wash. His firm has recently purchased an 8½-acre tract on the river and plans to install facilities which will be served by river barges. Mr. Puaria has applied for a permit to construct a wharf, a small conveyor, dock and dolphins at the site of the proposed plant.



This view of one of three screening floors shows spaciousness provided for ease in changing screen cloth and maintenance



Showing use of power handling equipment to lift iron-bearing slag from pan conveyor in primary section

NEW SLAG PLANT OF FLEXIBLE DESIGN

Plant of Buffalo Slag Co. utilizes surge pile and produces aggregate for many specifications; plant designed to facilitate maintenance

By BROR NORDBERG

EXPERIENCES GAINED through many years of operation in the crushing and screening of blast furnace slag are reflected in design of the new plant of The Buffalo Slag Co., located on property of the Bethlehem Steel Co. at Lackawanna just outside Buffalo, N. Y. The company produces slag products from three older plants at Lackawanna, Erie, Penn., and just north of Buffalo but the new plant, built to enlarge total capacity, differs from these earlier operations in many respects.

Outstanding Features

Probably the most important departure from conventional slag plant design is the use of a surge pile between the primary crushing section of the plant and the secondary section in order to insure a continuous feed to a high-capacity screening plant. This is believed to be the first slag processing plant designed around the use of a surge pile of partially processed slag and the results in terms of plant output have far exceeded expectations. The principal difficulty in the straight-flow plants built earlier has been costly interruptions to plant output due to delays in excavating the slag because of variations in the nature of the rough slag and in the occurrence of iron necessitating removal before loading transportation equipment. Those delays have been completely eliminated and the screening plant is efficiently operated because it is uniformly fed at a high rate of capacity.

Belt conveyors are used exclusively for intra-plant transportation, from the primary section to the surge pile,

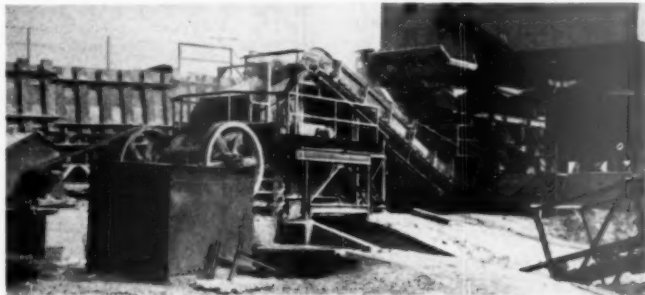
then to the secondary section, to the screening plant and in the crushing circuits. The older plants of the company employ elevators to a considerable extent and they have been a source of high maintenance costs.

All belt conveyors are of sufficient width that they may meet plant requirements when operating at relatively slow speeds, in anticipation of speed-up for increased capacity, in the future. Belt speeds are 300 f.p.m. or less with the exception of the primary conveyor to the screening plant which is run at 400 f.p.m.

Anticipated delays at the shovel were considered in designing for the capacities desired. From past experience, it was known that there could be an average delay of 20 minutes per

hour at the shovel, mainly due to the need for iron removal, and a 420 t.p.h. primary crushing unit accordingly was selected to guarantee 300 t.p.h. of slag delivered into the surge pile. Crusher drives are interlocked with the motors driving the conveyors feeding them. The screening plant is rated at 500 t.p.h. maximum capacity in finished products.

The plant has been designed for the maximum in iron removal, through the use of picking belts and magnetic conveyor pulleys, to recover an average of 240 tons of iron per week. Screening facilities are designed for flexibility in producing the 12 or 14 odd sizes of aggregates specified in New York State and Pennsylvania, through having a large total screening surface divided among 13 vibrating screens and with provision for diversion of the flow, and by having



Showing arrangement for blinding materials on blinding belt in loading trucks or cars

SLAG



Overall view of plant, taken before completion, of The Buffalo Slag Co. Primary section is in right foreground and surge pile is on extreme right. Secondary section is in right background before enclosing building. Conveyor at lower left transfers recrushed slag to primary belt to screening plant at left

crushing and recrushing facilities in anticipation of fluctuating seasonal demands for small sizes of slag. Currently, there is heavy demand for top surfacing material in the $\frac{1}{4}$ - to $\frac{1}{2}$ -in. size range. The table on page 116 shows the principal sizes specified and the size descriptions.

Conveyors are of heavy box truss steel construction to minimize the use of supporting towers in carrying long spans. Plant structures are of heavy steel and galvanized iron construction for maximum stability and to minimize vibration. Spaciousness was provided in order to facilitate repairs and maintenance of equipment. Bins are supported independently of the plant structure and the bins are of bolted steel sections for ease of replacement. Cars and trucks are loaded separate sizes direct or from either of two horizontal belt conveyors under the

finished material bins which enable the blending of sizes in loading.

Slag is excavated from a dump south of the steel mill by a 5-cu. yd. P&H electric shovel and is hauled to the plant in Euclid end-dump trucks carrying 16 tons to the load. The trucks dump into either of two 30-cu. yd. hoppers which are side by side, paralleling a 54-in. Stephens-Adamson pan conveyor discharging over a grizzly. Two 60-in. reciprocating feeders regulate the flow onto the pan conveyor. The grizzly is a Nordberg vibrating type and makes a separation at about 3 in. Oversize slag is put through a 36-in. x 54-in. Birdsboro jaw crusher and the discharge, with the grizzly throughs, is elevated and discharged onto the surge pile by a 30-in. belt conveyor. This conveyor and others in the plant are of Link-Belt manufacture.

Condition of the unprocessed slag varies widely in size from time to time. Where practically all of it will be put through the primary crusher on occasions, there are times when nearly all will by-pass the crusher. Use of a surge pile has the advantage of smoothing out these variations in feed to the secondary unit. Approximately 7500 tons is the capacity of the pile, of which 2500 tons is free flowing.

Material is drawn from the surge pile through a hopper opening by means of a 36- x 72-in. Jeffrey vibrating feeder which regulates the flow on to a 30-in. belt conveyor which transfers on to a horizontal conveyor belt in the secondary section of the plant. This is a picking belt and is 48-in. wide to thin the stream for ready detection of pieces of iron. Iron picked by hand is thrown through a chute into an

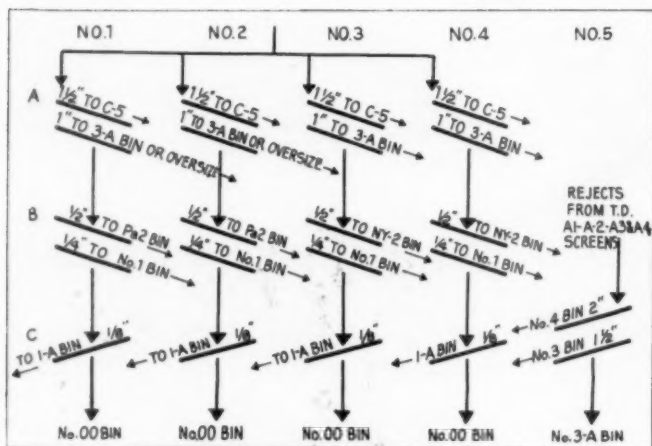


One of two reciprocating feeders regulating flow of rough slag to pan conveyor to primary crusher



Vertical chutes load sized material into cars or trucks and conveyor for combining sizes in loading

SLAG



Flexible screen arrangement for producing multiple sizes

		CRUSHED, SCREENED BLAST FURNACE SLAG										WASHED SCREENED GRAVEL									
SIZE NO.	NOMINAL SIZE	PERCENTAGE BY WEIGHT PASSING THE FOLLOWING SQUARE OPENINGS:																			
		4 IN.	3½ IN.	3 IN.	2½ IN.	2 IN.	1½ IN.	1¼ IN.	1 IN.	¾ IN.	½ IN.	⅜ IN.	¼ IN.	⅜ IN.	#4	⅜ IN.	#8	#100			
00	0-½ IN.																				
0	0-¾ IN.													100	30-100						
PA#1	0-½ IN.													100	85-100			10-30			
1A	½-¾ IN.													100	90-100		0-15				
1	¾-1 IN.									100				30-100	0-15						
PA#1B	¾-1 IN.												100			10-30		0-15			
PA#2	¼-¾ IN.									100	30-100	40-60			0-15						
2	1-1 IN.							100		30-100		0-15									
PA#2B	¼-1 IN.								100	30-100		20-50		0-10							
PA#3A	1-2 IN.				100	30-100	35-70			0-15											
3A	1-1½ IN.					100	30-100		0-15												
3	1-2 IN.			100		30-100		0-15													
4	2-3 IN.	100		30-100		0-15															
PA#4	1-3 IN.		100	30-100		35-70		0-15													

Standard specifications met in New York State and Pennsylvania

iron collection truck. The picking belt conveyor has a 30-in. Dings magnetic head pulley and iron removed at that point is conveyed by chute to an iron collection car. The conveyor discharges the slag over a 5 x 14-ft. double-deck scalping screen which determines the top size, usually 3 in., to be sent on to the screening plant. Oversize is put through a 5 1/2-ft. Symons standard cone crusher. The crushed and the by-passed streams of slag are collected on a 48-in. belt conveyor which has a 30-in. Dings magnetic head pulley. Iron dislodged through crushing thus is discharged by chute to the iron collection car and the slag is transferred to a 42-in. belt conveyor for delivery to the top of the main screening plant.

Screening Operations

The screening plant is an impressive structure. It houses 13 large vibrating screens, yet there is very little

vibration with all of them operating. All of the screens throughout the entire plant are Seco vibrating screens manufactured by Screen Equipment Co. Screening is done on three floor levels, with plenty of room provided for maintenance and screen cloth changes, and the screening structure is superimposed over finished product bins below.

The accompanying flow diagram illustrates typical practice in producing eight common sizes of materials simultaneously to meet the more common New York State and Pennsylvania specifications, although other grades than those considered in this description are produced as indicated in the table on standard sizes. Sizes produced in the flow considered herein are 1-1 1/2 in. (3A), 1/2-1 in. (N.Y.2), 3/4-1/2 in. (1), 1/4-3/4 in. (Pa.2), 2-3 in. (4), 1-2 in. (3), 1/2-1/4 in. (1A), and 0-1/4 in. (0).

Material conveyed to the top of the plant is put through a series of divider boxes where the stream is split into four equal parts and put over four banks of screens. At the divider boxes, the division may be regulated so that one bank of screens, or any combination of banks, may be operated with the remaining banks out of service. For the purpose of description, the four banks of screens on the top floor are designated as No. 1, No. 2, No. 3, and No. 4, and the slag is fed over the division points to screen Nos. A-1, A-2, A-3 and A-4.

All four of the screens are 5 x 12-ft. double-deck units with 1 1/2-in. sq. openings on the top decks and with 1 1/16-in. sq. openings on the bottom decks except that two are interchangeable to 3/4-in. sq. openings when producing Pa.2 (1/4-3/4 in.) slag.

Oversize material from all A screens is put over screen C-5, a 5 x 14-ft. double-deck unit on the first floor where No. 4 and No. 3 sizes are produced. This screen carries 2- and 1 1/2-in. sq. openings on the top and bottom decks respectively. Minus 1 1/2-in. material is put into the 3-A bin.

Rejects from the bottom decks of the A screens drop into the 3-A bin and the throughs are put over the top decks of the B series vibrating screens on the second floor, throughs from screen A-1 being put over screen B-1, etc. The B series of screens carries 1/2-in. and 9/32-in. sq. openings on the top and bottom decks respectively and the screens are 5 x 14-ft. size.

Oversize from the top decks of B-1 and B-2 screens is Pa.2 material and from B-3 and B-4 screens is N.Y.2 material. No. 1 material is the size screened between the two decks and the throughs from the bottom decks are put over single-deck series C screens on the first floor, maintaining the same numerical sequence. These screens are 5 x 14 ft. with 1/2-in. sq. openings. Overs are delivered to the 1-A bin and the throughs to the No. 00 bin.

Storage—Loading

Storage of finished materials is in eight large bins arranged in two rows of four so that all the coarser sizes are in the four bins on the east side for convenience in recrushing. Sized slag may be drawn from any of the four bins and discharged by chute into a 3-ft. Symons short head cone crusher or a 4-ft. crusher of the same design. Recrushed slag is transferred by a 24-in. belt conveyor to the main 42-in. conveyor for return to the overhead screening plant.

Sized slag is loaded directly into railroad cars or trucks. For purposes of blending there are two parallel belt conveyors, one under each row of four main bins. Five sizes may be combined in any mix on a 42-in. belt conveyor for loading cars or trucks. Coarse sizes are blended on a 36-in. belt con-

SLAG

veyor for loading. This conveyor inclines slightly, at the discharge end since it is planned to install a magnetic pulley for further iron removal particularly when loading out 1- to 2-in. slag for mineral wool manufacture. Gravity screens will be installed to eliminate any fines in the coarser slag products when the products are for mineral wool manufacture or for sewage treatment where fines are particularly objectionable.

At the present time, emphasis is on the production of considerable fine sizes of slag. It is estimated that 200 t.p.h. of the 500 t.p.h. screening plant capacity is being recrushed. Possibly 75 percent of total production is of minus 1/2-in. material and 90 percent minus 1 in.

The plant was conceived and designed by G. S. Synder. L. A. Beeghly is president of the Buffalo Slag Co. and Harris Snyder is vice-president. G. S. Snyder is manager of production and purchases, Clarence Swain is superintendent and W. F. Pierce is field engineer.

N.S.G.A. Convention Program

THE JOINT MEETING of the National Sand and Gravel Association, holding its 35th annual convention, and the National Ready Mixed Concrete Association, holding its 21st annual convention, will take place February 12-15 at the Hotel Roosevelt in New Orleans, La. Many of the sessions will be joint meetings of both associations, whereas others will run separately and simultaneously. The program that follows is that of the N.S.G.A.; joint meetings are listed here also. For the program of the N.R.M.C.A., turn to the report on page 168.

February 12

Annual meeting of the Board of Directors.

February 13

Joint session with National Ready Mixed Concrete Association. The two association presidents will make addresses; Vincent P. Ahearn, Executive secretary, and Stanton Walker, director of engineering, will submit their annual reports. A talk of the highway program for 1951 will be presented by Robert J. Potts, Harlingen, Texas, a former president of the N.S.G.A. and presently a member of the Texas Highway Commission.

The speaker at the luncheon will be the Major of New Orleans, the Honorable DeLesseps S. Morrison.

The afternoon session will be devoted to a discussion of operating problems. Mr. Walker will present a discussion of the fundamentals of aggregate specifications, which will be followed by a paper on crushing by Fred C. Bond, Allis-Chalmers Mfg. Co., and one by Frank Penepacker,



Showing conveyor (right) from primary section building, surge pile and reclaiming conveyor on left



Loading slag into trucks that haul 16 tons to the plant

president, Pacific Building Materials Co., Portland, Oregon, who will describe his company's plant in which sand is classified into eight different sizes.

Another afternoon session will deal with financial affairs. Among the subjects to be covered will be: the new excess profits tax, renegotiation, depletion and depreciation practices, certification of emergency facilities for accelerated amortization, the 3 percent tax on the transportation of property for hire, and cost determination practices for sand and gravel and ready-mixed concrete plants.

February 14

Joint meeting to be devoted to a round table discussion of emergency regulations, including: wage and price control, priority regulations, allocations of critical materials for maintenance, repair and operation supplies; construction curtailment regulations, defense construction requirements, and man power controls, including deferment of essential personnel.

The afternoon session will deal with problems of labor relations, including applicability of federal laws in this field. There will be discussion of the trend in recent labor agreements in the sand and gravel and allied industries, with specific reference to wage rates, hours of work, and general conditions of employment. There will

be a review of present practices with respect to such matters as group insurance, group hospitalization, sickness and accident insurance, and retirement and pension plans. Among the federal laws whose applicability will be considered are: the Taft-Hartley Act, the Wage and Hour Law, the Walsh-Healey Act and others.

February 15

The morning session will be the closing one. Election of officers will be held and safety trophies and certificates will be presented. A representative of the Army Corps of Engineers will present a paper on research in concrete aggregate. A. H. Smith, president, A. H. Smith Sand & Gravel Co., Branchville, Md., will discuss the problem which confronted his company as a result of a decision by a Maryland court which prohibited him from introducing waste materials into a navigable stream.

Instead of the Manufacturers' Reception usually held, all delegates will be invited to go on a boat ride around New Orleans harbor on Wednesday evening, February 14. The boat will leave the dock at 8 p.m. and return at 11 p.m. Entertainment will be provided.

Changes Address

ALPHA PORTLAND CEMENT Co., has moved its Chicago, Ill., office to 308 W. Washington St.

Zoning

Aggregates Industries Comment on Current Problems

Zoning, land rehabilitation, stream pollution and the need for improved public relations occupy attention of industry executives

THE REPLIES TO THE LETTERS sent by the editors to producers of aggregates for summary herein were invaluable as a gauge by which to appraise some of the current questions facing the aggregate industry. The geographical distribution of the replies was excellent and from them can be summarized the general pattern. It is obvious from reading the replies that suitable deposits of stone and sand and gravel throughout the United States are shrinking at a rate sufficiently fast to cause considerable concern and, in some localities, the producers appear to be desperate in their search for adequate reserves. Several companies reported that they keep prospecting crews in the field all the year around and, in this frantic search for additional sources of aggregate supply, spend up to \$50,000 per year.

The search stems from two main causes: First, is depletion of present deposits and secondly, zoning of great areas that contain known aggregate materials has gradually crept into the picture to such a degree that it is in many cases impossible to open up a new deposit. As a result, any reserves that could be obtained and worked are more isolated from population centers, and the deposits are often of such a physical character that operating them at current price levels is often impossible. This will mean that transportation costs to the builder become greater, and that the pit price becomes higher. The average citizen must be awakened to the fact that the rock products industries are a vital necessity and that when obstacles are placed in the way of their growth, it will only mean that he must pay more in taxes for public construction and more to build that home he so long has dreamed about. In many cases he will have to use poorer materials.

It is unfortunate and illogical that, in many areas, aggregate processing operations are classified as nuisance industries along with garbage dumps and other undesirable operations but the classification, in many cases, is due to negligence on the part of the producers, and is not confined to one particular reason. Poor plant house-keeping, dust, noise, stream pollution, battered up retail haulage equipment, all add up to the same answer. No one wants to live near such an operation,

By WALTER B. LENHART

not even the owners or workers in the offending plant.

The answers to the question posed in our letters to aggregate producers, tied in with field observations, enable us to divide the producers into three general groups. The first group are in most cases the larger and more efficient operations where plant house-keeping is of a high order. Dust has been eliminated and stream pollution not tolerated and they have been financially able to buy outright or lease, over a long period of time, land that surrounded them, thereby often increasing their reserves of raw material and they have established a sort of buffer zone between their plants and the adjoining neighbors. When such operators move into an area with a new plant, local opposition decreases rapidly. No de-valuation of adjoining property is experienced; more often the reverse is true and land prices go higher.

The second class is the small group who operate on the principle "of the public be damned." This type of op-

erator is not only a sore spot to the general public but to those aggregate producers who try to maintain good public relations. Several of the replies were aimed in this general direction, pointing to the need for action by some of the members of the industry itself. Here is a typical comment:

"I know that in nearby towns where the plants are not doing anything about the dust and have a 'public be damned' attitude that it is only a matter of time before injunctions are going to be sought to eliminate a dust condition which is really unbearable."

The third group is by far the largest. They operate reasonably well as judged by public standards and are keeping a weather eye on conditions and will jump into any breach when they think they have to. One might call these three divisions the (1) willing group, (2) the straddlers, (3) the injunction family. The time is propitious for the second group to move one step upwards as a means towards creating better public relations.

Dust is not the only factor that has singled out the aggregate operator as one to be zoned. In the replies, there was in many cases an expressed desire to rehabilitate worked over land because land that was once level and growing food is not only an eye-sore but is an economic waste. Not all the blame can be placed on the aggregate producers for coal stripping on a vastly greater scale, has helped to aggravate the problem and, as a result, the rock products industries are classed along with the coal strippers in the public's mind.

Public Opinion Important

One of the first group of large industries to feel the impact of public opinion, with reference to the destruction of surface soils, was the gold dredges, particularly in California. The operators left thousands and thousands of acres of once fertile bottom land (in most cases) a ruin of raked-up gravel domes. When the trend in public thinking became apparent, some dredges were equipped with dual stackers so that the soil and finer materials were placed on top of the coarse fraction.

Such land for many purposes, especially fruit trees, had its fertility measurably increased because of the open character of the ground and its



A typical Western batching plant on a large construction project

water-holding abilities.

From the letters received several were agreeably surprised at the net results obtained by their efforts to restore worked out land. A typical comment was one received from a producer in the Middle West. He said:

"At one or two gravel pits in this area some attempt has been made to restore the land for farming purposes. At an old pit the overburden had been dumped back into the pit, and the stripping piles were leveled off with grading equipment with surprisingly good results. It appears that this could be done at some of the other pits where stripping was handled in the same way." (Illinois)

Another up-to-date producer said, "We have initiated tree planting, back-filling, grading and sloping in a late attempt to solve the problem." (Minn.)

Not only have the coal strippers and dredge operator accented the theme of a need for rehabilitation of worked out farm land so as to direct attention to the aggregate producer, but segments of the rock products industry directly concerned with soil conservation and re-vitalization are equal offenders, among them some of the phosphate producers.

Sand and Gravel

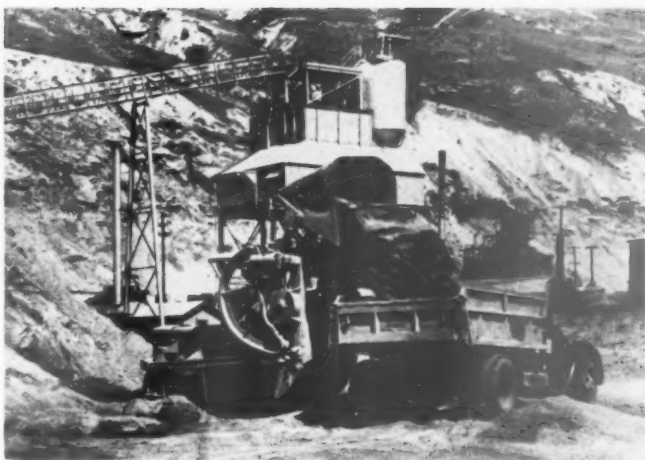
In answer to our queries regarding maintaining adequate reserves, a few typical comments will indicate the pronounced trend. Adequate reserves, zoning and rehabilitation are so directly related that, as in the quotations that follow, it is hard to separate the subjects. Typical comments follow:

"We have been desperately searching for and have been making numerous and continuous tests together with negotiations for acquisition of sand and gravel deposits throughout our operating area for many years. During the past few years this activity has been stepped up considerably and our efforts in this direction are almost tinged with desperation. We spend, for your information, a very considerable sum of money yearly on this activity." (Texas)

"We attempt to stay ten years ahead of the demand in adequate reserves." (Minn.)

"Zoning precludes the establishment of any sand and gravel excavating operation within the metropolitan area. Townships bordering on cities of the first class can and do zone themselves by merely posting a notice on the Town Hall door. Sand and gravel excavating is classed with rendering works, stock yards, etc. This classification is the result of our own negligence in this business." (Minn.)

"We have working continuously a crew of five men and three trucks suitably equipped for making exploration of gravel. Right now, at the rate we presently produce, we have about



This loading unit is heavy enough to find use in an iron ore quarry

ten years of reserves in the ground ahead of us and our exploration crew in most years finds new deposits to the extent of about twice as much as we produce, so that, in effect, we are gaining about one year's reserve each year that we operate." (Texas)

"For some years we have been aware of the fact of the increasing scarcity of good aggregate in our state and in our own producing area. Therefore we have been prospecting for satisfactory deposits. We have secured an excellent deposit that should last from 15 to 20 years, where we are installing a new plant with a large capacity." (Ohio)

"In the matter of adequate reserves, our company's policy has always been to have a buying program annually that equals and in many instances exceeds our sales volume. For the past few years we have been digging up all the industrial sand (silica) properties we could lay our hands on that are located at points that are advantageous to our processing plants. We are continuously prospecting in all areas. All in all, our total reserves in the ground today exceed anything in the history of the company. This does not apply to all plants, of course, but from an overall picture, we have more stock on the shelf now than at any other time in more than 100 years." (N. Y.)

One company in the East has found its portable plants to be excellent for preliminary prospecting. This operator has two permanent plants and three portables. He says:

"In our portable plant operation we have done some advance prospecting where we think there would be sizable jobs coming up in the next few years." (Penn.)

"The matter of zoning ordinances

regarding gravel pits has become very serious in this area. To begin with, there are very few deposits left in the South-Eastern part of our county, a rapidly growing area where we are located, and no gravel deposits at all in the adjoining county. Under the present ordinance in this township it is practically impossible to open a new pit." (Mich.)

"The closest production we have to an important city is about 70 miles, around which there are no cities, so we have not been bothered with zoning ordinances. There has been talk, through our territory, of land rehabilitation but no pressure. It is a matter that we are looking out for because we realize that pressure could develop but up to date it has been necessary for us to spend very little money on land rehabilitation." (Texas)

"The trend in this area is toward rigid zoning restrictions and there has been a decided pressure for land rehabilitation. We have been rehabilitating the land for some time as it can be done without much additional cost when it is done slowly, since stripping dirt has to be disposed of in some way anyhow." (Conn.)

Quarry Operations

The foregoing comments were from sand and gravel producers but the general subject was of extreme interest to quarry operators. Some of the trials and tribulations of quarry men are sketched in comments that follow:

"It certainly is true that deposits do run out if additional land cannot be acquired. This is often difficult and expensive in metropolitan areas. New quarry locations are impossible to find because even small towns are now zoned."

"We have been working on this

problem for over ten years and have added 17 years supply above natural drainage. This land was split up into dozens of parcels and the prices we had to pay were all out of line with purchase for any other purposes. After we assembled the parcels, it was then necessary to get the zoning act changed which is a long and tedious job and frequently ends in disappointment. Quarries do not have the problem of rehabilitation as gravel pits do because they do not overrun so much acreage and are rarely abandoned. We have been able to keep the dust, noise and vibration below the nuisance level. However, many of the quarries are having trouble with one or all of these problems. The failure of most quarry operators who surround themselves with protection property is chronic, and you would be doing them a service by calling this to their attention." (Mass.)

A second comment was: "Attempts to limit operations by imposing restrictions on testing, blasting, etc. have become quite common in the last few years. We are constantly troubled at our quarry where community developments have closed in on us. Zoning ordinances have certainly stopped any expansion ideas we might have had." (Ill.)

A third southern producer comments: "We have acquired additional land surrounding our plant to give full protection to blasting but realize that we cannot acquire sufficient land to eliminate complaints of noise." (Georgia)

The number of producers who are making serious efforts to eliminate stream pollution is, from necessity, growing. The control of plant rejects is not a casual subject as many surmise, but is one that should be studied, carefully. In this field of endeavor as judged from the letters received we have here "The straddlers" and "The injunction" groups.

Tailing Control

Tailing Control became so rapidly a "must," and, with so little available information on the subject, that the editorial staff of ROCK PRODUCTS made extensive and detailed studies on the technique used by western metal miners, as those operators have been retaining tailings 40 years or more. The findings of the field observations are being published currently in ROCK PRODUCTS.

Here is a comment from a large eastern crushed stone operator who appreciates the importance of a tailing pond that will do the job properly and which will last for decades.

"We have been following your series of articles on settling basins with tremendous interest. Already we have commenced construction of a large scale system to take care of our needs for many years. There are several details, however, about which we are uncertain and my company has

decided to send me to Arizona to get some first hand knowledge of the details of the methods used there." (N. Y.)

Many operators are fortunately located in areas where tailing control is a relatively simple matter as evidenced by one dredger who comments:

"All the plants in this area are not limited by any restrictions except we cannot muddy the rivers. It has been our policy to leave a 200 ft. strip of natural soil between our pumping and the river to prevent muddy water getting into the river." (La.)

Another one comments: "Fishermen objected to the discoloration of the stream. Within the last year we put in large basins in which we settle out the material, and are now meeting 100 percent the requirements for clear water that we put into the river." (Va.)

A third indicates the trend in public thinking and what the operator thinks will be the eventual action: "We have had complaints from the Conservation Department periodically on account of our letting our wash water run directly into the river which adjoins our plant, but no action has ever been taken to stop us. These complaints are usually made by local people who like to fish in the evenings, but as the stream has very few fish, and the wash water only serves to muddy the water for a short distance downstream, no legal action has been instituted to date. We expect that eventually the State will forbid our present practice as the state is becoming quite agitated regarding the pollution of the streams. This agitation is state wide." (N. Y.)

A silica sand operator commented as follows:

"We do not operate in any metropolitan district. All of our plants are isolated out in the country and we have had no trouble by any restrictions. Our policy is, however, to avoid stream pollution and dust conditions that might bring on restrictions. We have had no pressure for land rehabilitation." (N. Y.)

A Southern operator calls attention to the gradual encroachment of private building in directions that place the new homes in a critical area. He comments:

"Even though our plants are located in smaller communities, the tendency is to build residences and other buildings adjacent to the property, so that noise and possibly dust, create some sort of nuisance to these property holders. For instance, there was at one time, an objection at one of our plants because of night shift operations with its attendant noises from machinery and blasting. It is necessary at all of our plants to eliminate all dust possible, and so far, no

particular cure-all has been developed by us." (Ky.)

This same encroachment of others into an area that is already an industrial one is evidenced by this reply from a quarry operator. His reply also indicates how he helped reduce blasting complaints. "Like most quarry operations in a densely populated area, building is continually coming closer to our operations, but we have not been seriously affected except as to our blasting. We have practically discontinued secondary blasting and are using a drop ball to replace explosives. We believe this method to be more economical and avoids the complaints arising from that type of blasting. We are also reducing the quantities of explosives used in primary blasting in order to avoid criticism. It has been our practice over a long period of years to have seismicographic records made of all of our primary shooting and up to the present time we have not had any suits for alleged damage." (Conn.)

Pensions

On the subject of pensions and pension plans, the divergency in thinking ran from a pronounced antagonistic attitude to some surprisingly generous plans that fill the gap where no cut-and-dried pension plan is carried. Says one in this group: "We do not have a pension plan in operation but we have a profit-sharing plan in which each three months we take one-third of the profits, after allowing for all taxes, and divide this among the employees in proportion to their straight-time earnings. This was formerly one-fourth, but it is now one-third." (Va.)

Two other operators who seem to want to take care of employees who have been loyal over the years stated in their answers:

"We do not have a pension plan in operation but do have at the present time six employees whom we have pensioned at amounts ranging from \$50 per month to \$225 per month." (Conn.)

"We have an informal pension plan through which men who have worked for the company at least 20 years receive \$50.00 per month after retirement at 65. This amount is in addition to Social Security." (Calif.)

On the subject of a general pension plan as such and a plan that will cover all employees, there seemed to be a feeling that such will not work and one operator expressed himself as follows:

"We do not have a pension plan in operation and it is my personal opinion that all small company plans are impractical. Such employees should carry their own protection which costs only a few cents a day and can be moved with them from one job to another." (Mass.)

However, where no pension plan was in operation, there was an under-



The circular bin (left) supplies fine sand to a blending belt in a large modern plant on the Pacific coast. Good housekeeping even during construction stages is evidenced from the picture at right of a California aggregate plant

current of feeling that such would be on their agenda because of laws, unions, etc. A few typical comments follow:

"Regarding the pension plan, we do not actually have one in operation, although our union has asked for such a plan and we are checking into it with an idea of putting it into effect when our contract comes up for renewal, if we see our way clear to do this." (Tenn.)

* * *

"While we have no pension plan, group insurance was effected October 1, 1950, covering life and full hospitalization without cost to employee." (N. J.)

Plant Additions

Comments that typify types of improvements and enlargements of productive facility were as follows:

"During 1950 we installed a new bulk cement plant in our ready-mixed concrete plant. The concrete company is operated on a union basis 100 percent, our gravel company is operated non-union. Rates of pay of both com-

panies are the prevailing union rates." (N. Y.)

In many of the letters considerable share was devoted to plant improvements. The ready-mixed concrete producers seemed to be installing bulk cement equipment and going in for mixer trucks that will handle larger yardages. Premix installations in older plants were numerous and laboratory facilities were being installed. Several producers in the rock products field went into lightweight aggregate manufacturing and some of the older producers in this field made extensive addition to the productive capacity of their plants.

One made a pertinent observation relating to future business in his area. It might throw some light on what the outlook for road building will be during these critical times. Says this commentator: "Without question demand has increased as regards concrete pavement, as well as road surfacing material and asphaltic concrete. This is particularly true throughout the middle west as the road surfacing program has very

much increased, because the several states have all voted additional money for the building of secondary and farm-to-market roads, which has taken a considerable volume of material. As a consequence of this, we maintain a testing and coring outfit for taking cores of rock deposits, and it is continuously busy, developing new deposits and new locations. A great deal of the stone throughout the middle west is not acceptable for concrete, but is acceptable for road surfacing material."

Probably the first installation of its kind, on a dredge, was reported from one producer who said: "On our dredge, operating in land off the river, we are installing a rod mill to reduce the excess of grit to concrete sand size." (N. J.)

In another communication a new use of lime was indicated. Many lakes, it was said, become boggy and the water murky and the results are that the sunlight is absorbed before it can penetrate deep enough to reach plants producing oxygen for fish life. By

(Continued on page 137)



Concrete pipe as culverts may set a trend in road construction. Here pipe is laid for a large irrigation project in the West that will bring fertility to now arid areas



This machine places and finishes 1000 to 1500 lin. ft. of canal per day. At least three of this type were in operation. This is part of the Ephrata project in central Washington

Specific Heat and Heat of Calcination

Errors in available figures and misapplication of data lead to erroneous heat balances and therefore contribute to improper kiln design

By VICTOR J. AZBE

DETERMINATION OF KILN EFFICIENCY as well as proper design of kilns depends on specific heat of pertinent gases and solids and on heat of dissociation of carbonates to such an extent that unless a rather close knowledge is had, and this is used correctly, no satisfactory answer is obtainable.

To many persons it would seem the information is available in any reference book and that its application is a simple matter. But actually, there is much doubt about the available information. It is not commonly understood, in even the available form and is applied in an oversimplified manner, leading to heat balances that are completely erroneous and to kiln designs which, in some of the most important essentials, are wrong.

The engineer of course, has to work with what information is available to him. But he should be careful in his selection of data and make great effort to apply it correctly and not be too prone to the use of short cuts. Since the main responsibility for equipment performance rests upon him, so also does the duty of stimulating the scientist into the development of better basic information, correction of nonconformities and general reduction of the factors of ignorance.

Mean specific heat varies very greatly with the temperature range. The equations for calculation that often are being used are presented by the United States Bureau of Mines Bulletin No. 371, "High Temperature Specific Heat Equations for Inorganic Substances." For gases and solids pertinent to the lime industry it was calculated and presented by a series of graphs by J. A. Murray in the August, 1947, issue of *ROCK PRODUCTS*, in a laborious and very able accomplishment. We, however, do not like alignment charts. They are not direct reading and are cumbersome. We prefer something like that of Fig. 1 which is more ready of application and in addition also shows the trend of the change.

This figure presents heat content of gases, oxides and carbonates over 72 deg. F. and is essentially the same as would be obtained from Murray's data. It also shows the upward curving tendency which demonstrates how wrong one could be by just taking the specific heat at any one point and applying same to the entire temperature range as is frequently being done. Even at best one may be wrong as there are certain doubts about specific

heat particularly at the higher temperature. If this then is compounded by incorrect calculations, and over-simplified assumptions the results become useless.

Our aim here is construction of a "Heat Content Diagram" which depends on specific heat, heat of dissociation and certain relationships of these. Calcium oxide at atmospheric temperature has a certain higher inherent energy content than its representative portion of calcium carbonate which may be called either heat of dissociation or formation. This depends somewhat on the calcium carbonate. If calcite, the amount is slightly greater than if precipitated chalk. It may be 1378 B.t.u. or only 1350 per lb. of CaO. The writer has used the higher figure of 1378 for many years.

However, this amount is different and less for every rise in temperature which is not generally appreciated and great errors are committed thereby.

The energy of attractive forces diminishes progressively as temperature increases and so the energy (heat) required for molecular translation (dissociation) also diminishes. At the critical point heat of dissociation would be zero as there would

be no holding power between CaO and CO₂ of the CaCO₃. To attain this critical point the carbonate would need to be subjected to very high temperature which would only be possible at very high pressure. There then would be no latent heat imparted; it all would be sensible heat of preheating of CaCO₃ to the critical point.

The whole is very similar to evaporation of water as may be noted by the study of any set of steam tables. Latent heat of evaporation gets progressively less as temperature of evaporation rises and in this case also there would be a critical point.

Occasionally some persons become confused and reason that if this is true, lime could be made at very high temperature for which a closed vessel would be required. Then any heat imparted to CaO and CO₂ of the carbonate would be regained in the recuperative cooling of the CaO and CO₂, and the sum total of heat required for calcination would be zero. This, of course, cannot be so since latent heat of CaO at 80 deg. F., is 1378 B.t.u. per lb., as latent heat of steam, at 212 deg. F. it is 970.4 per lb.

The whole makes this difference though, to the heat of preheating of CaCO₃, must not be added the figure of 1378 but rather the heat amount required at the dissociation temperature, making the combined amount considerably lower with the difference coming from the heat of low elevation of preheating CaCO₃ to calcination temperature.

While incorrect use of specific heat data is the first great source of error in most kiln calculations, the failure to properly apply the heat of dissociation is the second.

The effect of temperature level on the heat required for the actual dissociation is better presented by the four step cycle plotted on temperature-heat coordinates.

In the field of calcination, dissociation is mostly conducted at CO₂ tension of one atmosphere or less, that is at atmospheric pressure, and only occasionally at higher CO₂ tension. This latter, when CO₂ escape is obstructed, as by high flow at high capacity rates, by surface shrinkage of lime or by formation of surface slags before calcination, is completed internally. In case of dolomite, CO₂ escape from calcining MgCO₃ may be obstructed by the still remaining CaCO₃, which could explain why dolomite is prone to an indefinite initial dissociation point, depending on time, rate of

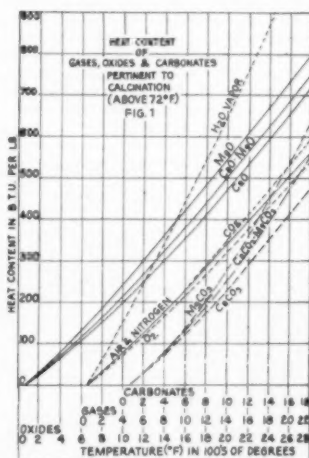


Fig. 1: Heat content of gases, oxides and carbonates pertinent to calcination above 72 deg. F.

exudation or, in other terms, degree of internal pressure.

Fig. 2 presents the "Heat Content Diagram for CaO" based on 1 lb. of CaO. Heat of preheating is 776 deg. F., and heat of dissociation is 1308 or a total of 2084 B.t.u., the latent heat of CaO.

In the case of the actual kiln, lime is not withdrawn at 1648 deg. F., the dissociation temperature; its temperature may be raised to 2400 deg. F., and in case of sinter dolomite the calcia portion may be raised to 3200 deg. before being discharged. To make the diagram of Figure 2 more useful, heat content of CaO for the elevated temperatures is also plotted and makes it most practical. Compared to 1378 B.t.u. the latent heat, sensible heat content of CaO for a lime kiln is 597 B.t.u. and for the clinker dolomite kiln 864 B.t.u., that is 42.4 percent and 62.7 percent respectively; both surprisingly high figures.

We must realize of course, that sensible heat of CaO is potentially heat of high elevation fully capable of making the equivalent portion of additional lime. The whole reveals the cooler of a lime kiln to be even more important than the calcining zone, as if the calcining section is limited and calcination will extend into the preheating zone. But, as a rule it never is limited and neither is the preheating zone, while the cooler is always deficient and often completely absent.

Figure 3 is a similar diagram constructed for MgO. Being that heat of dissociation of $MgCO_3$ is less and specific heat of MgO more, heat wastage through non-cooling or non-recuperative cooling is even greater. With latent heat at 1170 B.t.u. heat in MgO at 3200 deg. F., corresponding to a sinter dolomite or magnesite kiln, sensible heat content of MgO would be 932 B.t.u. or 80 percent, and for any lower operating temperature the respective figure indicated along the upward sloping line.

This so presents the great importance of knowing the correct specific heat, to determine the heat of preheating of the carbonate and to evaluate the possibilities of recuperative cooling of CO_2 and particularly of the respective oxide. In addition we must have the correct specific heat to determine the heat of dissociation as previously mentioned C plus D—A equals B. For the present there is nothing for us to do but to use the data here presented but indications are that something, somewhere, is wrong.

Figure 4A presents a curve indicating how the heat of dissociation should diminish to extinction with the temperature rise in accordance to Q equals 42900 plus 2.183T plus .005485 T^2 . The 42900 is the J. Johnston value in gm. calories at 80 deg. F. per 100 grams of $CaCO_3$.

Figure 4B presents only a section of the previously indicated curve. The portion within the usual range of dissociation shows temperature prevail-

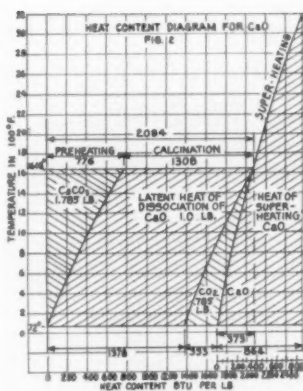


Fig. 2: Heat content diagram for CaO

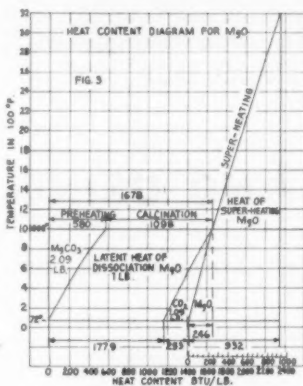


Fig. 3: Heat content diagram for MgO

ing in the lime kiln. It will be noted that at 80 deg. it is the previously mentioned 1378 B.t.u.; at 1648 deg. where dissociation takes place at one atmosphere of CO_2 it only is 1223 B.t.u. or 85 B.t.u. less than previously derived from specific heat data.

So the question is: Which is right? The difference is too great to pass it off. We are presenting the problem for solution to conversant individuals both in this country and foreign countries. We should know and we must know.

In the effort to explain it we studied German data, particularly the very able presentation of Wilhelm Anselm's "Die Warmerechnung bei Brennofen" (Radex Rundschau Heft 1, 1950). The specific heat that he uses, and which the German Steel Industry accepts, is not the same as that of the Bureau of Mines Bulletin No. 371. Their data, as also ours, are plotted in Fig. 5.

There is still another indication. If we calculate the heat of dissociation of CaO at higher temperatures than 1648 deg. F., from our specific heat tables the heat of dissociation does

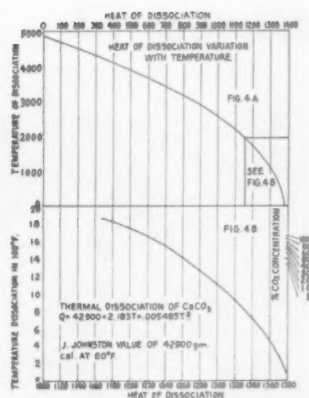


Fig. 4A: (top) Heat of dissociation variation with temperature. Fig. 4B: (bottom) Thermal dissociation of $CaCO_3$

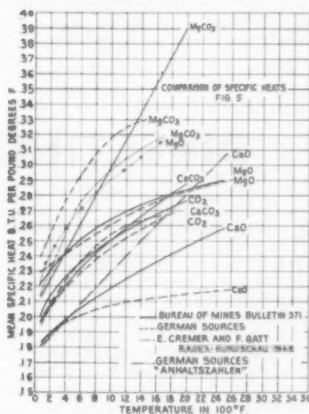


Fig. 5: Comparison of specific heats

not tend to reduce, while it should, in fact it must, which proves that specific heats at higher temperatures are wrong, most likely those of $CaCO_3$ and $MgCO_3$.

This matter will be followed through actively by the writer and any comments thereon will be greatly appreciated. Until we know more, diagrams of Figures 2 and 3 would apply and they can be used with great benefit, particularly in reference to the recuperative cooling of lime.

2000 Days Without Accident

PENNSYLVANIA-DIXIE CEMENT CORP.'s Clinchfield, Ga., plant has completed a safety goal of 2000 days without a lost time accident. M. L. Silicon, plant manager, said the 2000-day goal was set May 19, 1945, and during the six-year period about 200 employees have worked over 2,000,000 man-hours. A new goal of 3000 days has now been set.

Research



Elephant Butte dam on the Rio Grande. Built in 1916, this concrete dam was erected without many of the present day specifications, but it serves its purpose well and is in good structural condition

There is a distinction between pure and applied science that needs recognition for best combined use of talents of researchers and engineers

DIRECTING AND USING RESEARCH

SEVERAL MONTHS AGO we published an article that some readers thought was not too complimentary to engineers and construction men as researchers in *pure science*. One such researcher came back very pointedly with the statement that while he did not disagree, he did want to emphasize that the engineer is the logical person to point out to researchers in *pure science* the problems met with in construction practice, and the need for adequate answers. In other words, the construction engineer, or the manufacturer or the user of cement and concrete, is necessarily an important factor in the development or the direction of the kind of research activities in cement and concrete which we are discussing here.

This is a conclusion we think indisputable. However, along with it is the equally logical conclusion that the engineer user of cement and concrete is obligated to make use of the results of researches in *pure science* as they unfold or develop. For example, the problems of engineer users of cement have caused the manufacturers of portland cement to spend many thousands of dollars for *pure scientific* research, the results of which engineers in general have not yet learned how to apply. Nor will they learn to apply them until at least some of these results have become so associated with the other underlying sciences regularly applied by engineers that they can see the practical significance. We do not believe it is any more the func-

By NATHAN C. ROCKWOOD

tion of a researcher in *pure science* to point out the applications of his work than it is the function of the engineer to make discoveries in *pure science*. There is the same distinction



Ross dam on the Skagit river is probably one of the finest pieces of massive concrete construction in America. The secret seems to be that ample portland cement was used, along with a river aggregate and close job supervision. No additives or replacements were used. Practically all concrete authorities in the Northwest seem to agree that this concrete construction is outstandingly good

we have made before between *pure* and *applied science*, and the two kinds of intellect involved.

We cannot express this thought better than did T. C. Powers, of the research staff of the Portland Cement Association, in a brief paper, "Some Observations on Using Theoretical Research," presented to the annual convention of the American Concrete Institute in 1947 (*Journal of the A.C.I.*, June, 1947). He and his associate, T. I. Brownyard, had reported in a series of papers, 1946 and '47, already published in the *Journal*, covering some of the physical (colloidal) properties of portland cement pastes. These had been criticized by members of the Institute (chiefly designing and construction engineers) as being too theoretical to be of practical value. As Mr. Powers pointed out, engineers are apt to expect from research only handbook type of information which requires little special knowledge to apply. This result can hardly be expected from the kind of research reported.

These researches have since been assembled in one volume as Bulletin 22 of the Research Laboratories of the P.C.A., and we trust that in this form they will receive more careful reading and study than they did as published separately and serially in the *Journal of the A.C.I.* They are concerned almost exclusively with the problem of what becomes of the water taken up in the setting and hardening of portland cement paste. What makes

this report hard reading for the average engineer user is not only his lack of familiarity with the concepts of physical or colloid chemistry, but the fact that this report describes in much detail the experimental methods employed, with constant emphasis on the possibility of their limitations and inadequacy to answer definitely all the problems involved. This leads to the snap judgment that the report is of theoretical value only. The analytical methods and mathematical treatment are necessary to those who wish to pursue similar research, but are not essential to grasp some of the significance of the results obtained. Mr. Powers was entirely frank in stating that others interested may, and indeed should, for the good of the cause, make their own interpretations.

Three Kinds of Water

Using laboratory methods and theories that have been developed by colloid chemists, the authors conclude that hardened cement paste consists primarily of a gel, and of calcium hydroxide and calcium sulfo-aluminate crystals of minute size, and of unhydrated or anhydrous crystals of clinker. While it is possible to obtain crystals of tricalcium aluminate (C₃A) and the tetracalcium aluminoferrite (C₄AF) by hydration in a large excess of water, it is not believed such crystals are formed in portland cement paste. These alumina and iron oxide compounds, whatever they may be, are evidently, like the silica, in the form of colloid gels or gellatinous precipitates until some of the alumina is reacted upon by the gypsum.

The authors divide the water retained in the hardened cement paste into three categories: (1) chemically bound water (in the calcium hydroxide and possibly the sulfo-aluminate); (2) gel water (in the finest pores of spaces within the gel structure); (3) capillary water in the interconnecting pores or capillary channels between the gel particles, or micelles. The wa-



Pouring concrete on one of the 25-ft. dia. siphons near Ephrate, Wash. This is part of a gigantic irrigation project going forward in that area. Twelve pumps, each powered by a 65,000-hp. motor, will pump water out of Grand Coulee dam to supply water for the project.

ter in the case of hydrated lime has reacted chemically with the O in CaO to form two hydroxyl (OH) ions and the bond between these (OH) ions, which electrically are negatively charged, and the Ca ions, which are positively charged, is what is known in chemistry as an ionic bond. It is generally the only kind of a chemical bond met with in geochemistry, according to geochemists. The other kind of a chemical bond is called a covalent bond, and consists of two or more adjacent atoms sharing outer orbit electrons with each other to form a molecule of the compound. The bond between two atoms of atmospheric oxygen is such a bond.

The distinction between the gel water and the capillary water is difficult to draw because the physical and/or possible chemical forces which hold the water within the solid paste differ apparently only in degree, and that degree of withholding force is conditioned to the size of the opening or cavity. By methods elaborated in detail in Bulletin 22 of the P.C.A., it is estimated that the pore size within

the gel ranges from probably 20 to 40 Angstrom units (or 20 to 40 times 10^{-8} centimeters) across, or in diameter if considered spherical or cylindrical. The average width or diameter of the capillary channels in the interstices or between the gel particles is estimated to be 10 or 20 times as great as the 20 to 40 Angstrom unit size of the gel pores.

Water flows in and out of the capillaries readily as liquid or vapor under conditions of test, and the authors of Bulletin 22 call this *evaporable water*, if it can be removed by a certain standard anhydrous desiccant (drying agent) and reduction of the vapor pressure relative to the vapor pressure at saturation. In other words, the process is similar to suction in an hydraulic pump in raising water in a pipe line. Water can also be removed from the paste by heating it, just as water is evaporated in a boiler tube, by increasing the vapor tension of the water. The authors select as standard the loss of water from the paste at a certain low rela-

tive pressure (—) at 23 deg. C., P_v .

which is about the equivalent of the amount of water or moisture lost by heating the paste to 105 deg. C. at atmospheric pressure; and then they arbitrarily say that the water which is removed is *evaporable water*, and the water that is not removed is *non-evaporable water*. However, they recognize that this is an arbitrary division line, and that, of course, if a different standard were used the proportions of evaporable and non-evaporable water which they use throughout the investigation would be changed accordingly. This, of course, prevents use of the data as absolute values, but it does provide something tangible to discuss.

What For, the Water?

We might begin by asking why we use water to make concrete. Solid particles of most materials will bind themselves together into a solid by some kind of a physical attraction if



One of the finished segments of the irrigation projects near Ephrate, Wash. The concrete is machine-placed and as soon as finished is painted with a white curing compound that retains the water in the mass. Longitudinal and cross-sectional expansion joints are provided at close intervals and these are filled with an asphaltic material. The concrete is quite new but appears to be in excellent shape.

they are sufficiently small and the film of adsorbed air, gas, or moisture, on their surfaces is entirely removed. This adsorbed film prevents actual contact of the particles. The film can sometimes be removed by chemical means, by heat, sometimes by great pressure, an example of which are castings made with powdered metals. Materials which are finely pulverized with adsorbed air films act as fluids, as users of cement pumps, air-flow conveyors, etc., are well aware. Let the air be squeezed out and the cement or other materials become consolidated and act like a solid. Were a pat of dry cement to be compressed as powdered metals are compressed, we probably would get a solid of considerable strength without water. We certainly would if we compressed colloidal silica, which is supposed to be the true binder in portland cement, or if we compressed colloidal clay until it becomes shale.

Water then, we may say, is necessary for making cement paste, mortar and concrete for two reasons: (1) To aid in producing and dispersing the colloidal particles of lime and silica, alumina, etc.; (2) to provide the necessary plasticity or pliability to the mixture, so that it can be molded. The water performs the first function by hydrating the lime and thus separating it from the silica, alumina and iron oxide, which break up into such small particles that they are mostly colloidal in size. The water alone at first disperses these colloidal particles, which have negative electrical charges, and hence repel each other to form a colloidal sol. As the lime goes into solution (or possibly also into a colloidal sol), the electrical charges on its particles being positive, they are attracted to the silica, alumina and iron oxide particles, and tend to precipitate or agglomerate the whole. However, as the concentration of lime in the solution or colloid sol increases, the silica, alumina and iron oxide particles take on an outside shell of lime, or calcium and hydroxyl (OH) ions, and again tend to repel each other. There is, therefore, a certain lime concentration in the water when the tendency of the particles to agglomerate or consolidate will be at a maximum. This occurs first with the alumina gel particles because its negative charge is weaker than that of the silica gel particles. The foregoing is our own theory, not that contained in Bulletin 22; however, it is in keeping with modern colloid theory that electrically charged colloids surround themselves with clouds or layers of oppositely charged ions or colloids. The inside colloid particles tend to coalesce or precipitate only when the electrical charges on the adsorbed particles become equal to the opposite charge on the primary particles, or the sol is neutralized.

What we are leading up to is the apparent conclusion of Bulletin 22 that a generous amount of gel water (non-evaporable) is essential and



Hoover dam and powerhouse. This is the world's highest dam and is constructed of concrete. No cracking has developed and the structure is an excellent example of concrete construction.

harmless. It is only the capillary water, it is said, that freezes and thaws and destroys concrete. It does suggest that some of the gel water possibly may be drawn out into the capillaries when the water in the capillaries freezes, because this has the same effect as reducing the vapor pressure in the capillaries. If it does come out of the gel and joins the water in the capillaries, it freezes too. Some of the water that actually remains in the gel, the researchers call *compressed water*, since calculations on the space it occupies is only 0.8 or 0.9 of the space free water, such as that in the capillaries, would occupy. Other investigators have estimated that water retained in the smallest pores of a silica gel is held under a force equivalent to a pressure of 17,000 atmospheres, or roughly 250,000 p.s.i. However, since no silica gel or cement paste would withstand such pressure, this is not a measure of pressure but of the surface tension and vapor tension of water in a film only about one molecule thick on the walls of the pores. This accounts for the great difficulty in removing the last vestige of gel water, but it can be done and has been done in the case of silica gel by heating in a vacuum. It does not change the shape of disintegrate the specimen, which is considered proof that the water is not joined to the silica by an ionic bond.

Is This True?

On p. 250, the authors, speaking of the water that actually enters chemical combinations to form new solids, state: "If all such water is driven from the paste, the cohesion of the paste is destroyed." That we don't believe. If only the calcium hydroxide and calcium sulfo-aluminate contain chemically bound water, and we know that heating the paste to 450 deg. C. will recalcine the calcium hydroxide, or drive off its water of crystalliza-

tion, concrete would disintegrate if heated to 400 or 500 deg. C. On the contrary, concrete may be heated in laboratory fire tests, or in actual building fires, to temperatures that certainly leave little contained water of any kind, without losing its integrity. It would appear, therefore, that neither the lime nor the water, and certainly not the calcium sulfo-aluminate, is essential to concrete after it has been placed and hardened. Agate is a colloid of silica containing some water. It can be rid of all its water without changing shape or volume. The gel pores originally filled with water become filled with air. Chert aggregate can be dried in the same manner so that it will not again adsorb as much water as it originally contained.

On page 289, the authors state: "The non-evaporable water content increases with the length of the curing period [continuously in water]. The evaporable water content, which is the difference between the total and the non-evaporable water decreases as the length of the curing period increases." This, apparently, is considered a good omen, and proof the cement is becoming more completely hydrated. Is that true, or is the gel merely becoming more extended, or so much less concentrated? It would seem to us that the more solid the paste the better and the more durable the cement would be. Nor does it seem essential to accept the theory that the gel water is necessarily, or relatively, harmless. It creates the fine porosity of the gel, the more water the more porosity; and whether these pores are filled with "compressed water" or air, they don't do the paste any good. Nature's own rocks which have this kind of porosity are notoriously non-durable.

The evidence of Nature is in the opposite direction. The larger capillary pores while they result in permeability and allow water and solutions to enter, also permit evaporation and deposition of mineral precipitates which in some instances at least tend to make the rock more durable. We have previously called attention to the Indiana oolitic limestone as an outstanding example of this, but there are many examples of coarsely grained rocks (which means coarse porosity, also) that are notably weather resistant. As to be expected, the conclusions in this report are that higher water-cement ratios result in both more gel water and more capillary water. In other words it provides another scientific demonstration of the harmful effect of the high water-cement ratio on the physical properties of cement paste and concrete. But that seems to us is so only because practice provides no way of eliminating the excess water.

Effect of Cement Composition

We suggested a year ago, before we had studied Mr. Powers' researches, that the apparent detrimental effects

of a high alumina content in portland cement appeared to be because the alumina gel is more readily extended by the adsorbed water, or makes a more hydrous gel. Therefore it hardens to a more porous solid and is thus more susceptible to weathering or to disintegration more readily from absorption of corrosive solutions such as sulfate waters. We believe this is shown in Figs. 15 and 19 of the first paper, and the accompanying text. Both hydrated C₂AF and C₂A lose more water at lower temperatures than do C₂S and C₃S. Also, they retain more water at lower relative vapor pressures than C₂S. Later, in Part 3, where the authors assign relative values to each of these components of portland cement as deter-

mined by $\frac{V_w}{W_n}$ ratios, it is shown that

C₂A and C₂AF have weighted values of 0.00317 and 0.00368 (Eq. 4, p. 486) respectively as against 0.00230 for C₂S.

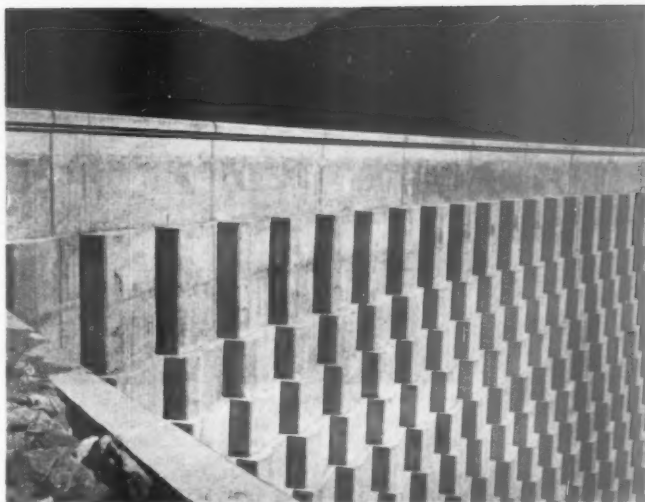
According to the terminology used V_w is "the quantity [in grams per gram of dry paste] of water adsorbed which is required for a complete condensed layer on the solid, the layer being one molecule deep." Therefore it is a measure of gel pore area or volume. W_n is the non-evaporable water in grams per gram of dry paste. It

follows that when the ratio $\frac{V_w}{W_n}$ increases, it means V_w accounts for more of the non-evaporable water. The Type II and Type IV cements shown in Table 3-5, p. 487, have consistently higher ratios than Types I and III. Types II and IV are distinguished as having lower alumina contents than Type I. Or, vice versa, less of the V_w is accounted for as non-evaporable in high alumina cements than in low alumina cements. And that, we would conclude from the authors' own arguments, makes this water more dangerous to the integrity of the hardened paste.

Why So Much Water?

These researches, together with Mr. Powers' report "The Bleeding of Portland Cement Paste, Mortar and Concrete" (Bulletin 2, Research Laboratory of the P.C.A., 1939) give the impression that it is desirable to convert as much as possible or feasible of the water remaining in hardened cement paste to non-evaporable water. In other words, he would reduce "bleeding" by use of more cement, finer grinding, or the use of some other equally fine material such as pulverized silica, or in the more obvious and generally accepted way of reducing the water-cement ratio. Bleeding, as he says, is a special case of sedimentation.

It is a special case because the laws of sedimentation are not allowed to function as they could. Sedimentation is restricted because the particles are



The downstream face of Ross dam on the Skagit river north of Seattle, Wash., has been cast in the manner shown as it has been planned to build the dam higher at a later date, and the offsets will possibly make a better band



Shasta dam on the Sacramento river is the keystone of the Central Valley project. It is not only a beautiful structure architecturally, but it ranks high as a sound concrete structure

settled in a watertight compartment where settling of the particles is hindered and restricted by the currents of water rising between the particles. The result is segregation with the finest materials being floated toward the top. Natural sedimentation, when it forms rocks or consolidated sediments as in the conversion of clay to shale or slate, permits the water to escape below, thus adding the friction or suction of the water to the force of gravity acting on the particles. This distributes or disperses the fine materials into the voids below the surface, instead of floating them toward the top and creating voids below them.

It is also a special case of sedimentation because the natural forces causing sedimentation are shortly interrupted and soon nullified by the agglomeration of the cement particles, or by the resulting increase in the viscosity of the fluid. This of course is

helpful in preventing all the fine cement particles from rising to the top, but unfortunately it also traps a lot of water, which would better be gotten rid of. If the fine material were inert the process of sedimentation with the water drained off from below would continue until all the particles were practically in contact with one another and a solid of considerable compressive strength, without any cementing material, would result.

When Mr. Powers gave the substance of this report as a paper before the annual convention of the A.C.I. in 1939 (*Journal of the A.C.I.*, June, 1939) he left the impression that bleeding, *per se*, was harmful and something to be avoided. The same idea seems to be contained in the later investigations reported in Bulletin 22, already referred to. We were particularly impressed with the discussion of

(Continued on page 162)



Rotary drill set up for drilling horizontal holes

Pattern of underground mine development and drilling at Bellefonte, Penn., plant of Warner Co. discussed; diamond bits used for all long hole drilling

STOPE MINING OF LIMESTONE

By H. A. CORRE*

THE BELL MINE of the Warner Company is located at Bellefonte, Penn. This mine is operating in the Bellefonte Ledge, or the Lowville limestone, which has a calcium content averaging between 97 percent and 98 percent CaCO_3 .

The underground workings are reached by an inclined, three-compartment shaft 8 ft. by 24 ft. in cross section. The slope of the shaft at the surface is 52 deg. and at the shaft bottom the slope is 80 deg. The main shaft is 768 ft. deep. The Bellefonte ledge is contacted by a drift approximately 93 ft. long from the footwall of the shaft to the footwall of the ledge. This permits the installation of a loading pocket and loading station below the drift of the mining operations. The loading pocket has a capacity of approximately 1300 tons.

One of the compartments in the shaft is for the manway and service hoisting of men and materials. Balance type skip hoisting is used for the hoisting of stone. A 350-hp. motor is used to hoist the skips at a rope speed of 950 ft. per minute, each skip holding 5.5 tons of stone. Fig. 1 shows the relationship of the main shaft to the loading pockets and the Bellefonte ledge.

Underground Development

The main, or haulage, drift is driven on the footwall along the strike of the ledge and in the ledge. This drift is 9 ft. by 12 ft. in cross section and widens out to 9 ft. by 20 ft. at

side track location. Along the footwall at 60 ft. to 65 ft. intervals chute raises are put up 30 ft. to the sub, or monkey drift. This sub-drift is 6 ft. by 7 ft. and is driven 20 ft. off the footwall towards the hanging wall and parallel to the main drift. From the footwall side of the sub-drift an opening is made toward the footwall to permit the installation of a bar-type grizzly. This grizzly opening inter-

sects with the chute raise that has been put up from the main drift. The grizzly opening is 14 ft. wide, from which two finger raises are put up 20 ft. to meet the stope undercut. Finger raises are belled either by benching process from the undercut or by the use of stoper drills from the grizzly entries before the undercut is made. V-type cut, 16 to 22 holes, depending upon the width of the drift, is used in advancing the drifts. At present burn cuts are used to some extent for this work. Blasting is done by using $1\frac{1}{2}$ in. by 8 in. 60 percent gelatin dynamite and regular delay type detonators. The main drift is mucked up by the use of a mechanical shovel loading directly into cars. The broken stone in the main drift is removed by the use of a two-drum slusher that empties into one of the lower chute raises which has been provided with a steel arc-type chute gate. The lower chutes have a capacity of 11 to 14 cars of stone. Fig. 2 shows the location of the drifts in respect to each other and to the ledge.

Man raises 6 ft. by 6 ft. in cross section are put up on 355 ft. centers along the main drift which provide entrance to the sub-drift and the stopes. Pre-fabricated ladders are used in all raises. Ladders are of yellow pine stringers with oak rungs. The ladders are 18 in. wide with a spacing of 12 in. between the rungs.

Mining in Stopes

The man raises are put up to the full height of the stopes, 250 ft. above the floor of the main drift. At 30-ft. intervals the raise is cross-cutted to

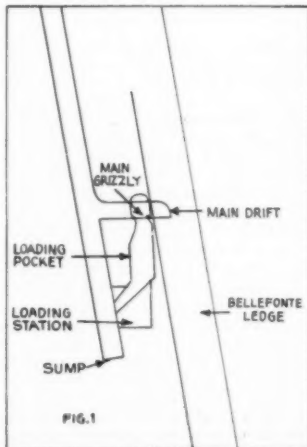


Fig. 1: Cross section of shaft and ledge

*Assistant mine sup't. and mining engineer, Bellefonte Div., Warner Company, Philadelphia, Penn.

provide means of getting into and out of the stopes. A wall pillar of 40 ft. is maintained at each raise. Fig. 3 is a vertical elevation of a typical stope.

The Bellefonte Ledge is about 60 ft. wide measured at right angles to the dip of the vein. Mining to full width is not obtained since 5 ft. of stone must be left to prevent the shaley material found on the hanging wall from sloughing off and contaminating the marketable stone. The stopes in the Bell mine, upon completion of the mining operation, are 55 ft. wide, 190 ft. high, and 315 ft. long.

For the most of the life of the mine the conventional shrinkage system has been used in which the roofing, or stope advance, was done by percussion drills. In this method a slot was made that went into the stope along the pillar line to the hanging side of the stope. When sufficient room was obtained the work progressed along the strike toward the other end of the stope by drilling up to 20 ft. holes and blasting each day. This system required perfect control of the broken stone in the stope to permit the men doing the drilling to have sufficient space in which to work. Several years ago the long hole blasting type of mining was introduced, which has brought about a variation in the shrinkage system of mining in part of the mine, to a complete revision of the mining system to sub-level system in the other. Both systems will be discussed.

Shrinkage System Using Long Blast Hole

The method used in the Bell mine at present on the shrinkage system consists of three steps, as follows: (1) Starting at the under-cut, located at the first cross cut above the man drift, a 6 ft. by 6 ft. raise is put up on each end of the stope. These raises are on the footwall inside the stope limits and connect the cross cuts from the man raise. This permits entrance into the stope from the man raise at all times since the roof of the stope is always below the open cross cut and provides the starting of the second phase of the operation—the slot. (2) After a stope shot is blasted the miners install a platform in the inside raise described above. The 6 ft. by 6 ft. raise is then enlarged to an opening approximately 15 ft. by 15 ft. toward the hanging wall and the center of the stope above the roof line. The long blast holes are drilled from this 15 ft. by 15 ft. slot. (3) The long hole drilling is a horizontal fan type as follows: One hole is drilled parallel to the footwall 140 ft. to the center of the stope with one set-up of a vertical bar. The bar is then re-set approximately 6 ft. toward the hanging wall from the first hole. The second hole is drilled 140 ft. deep parallel to the first one. From this second setting of the vertical bar the fan drilling pattern is started and continues until a 90 deg. fan is completed. The holes drilled from the second setting of the

bar are spaced 10 ft. apart at the bottom of the holes. Six holes, 140 ft. deep, are drilled across the width of the vein. Six additional holes are drilled on the hanging wall, decreasing in length until the 90 deg. pattern is completed. The final hole is 45 ft. in length. The third setting of the bar is made to permit the drilling of two holes 45 ft. in length. The third setting of the bar is made to permit the drilling of two holes 45 ft. deep toward the hanging wall and parallel to the pillar line. A two-man crew averages 150 ft. of drilling per day on the horizontal drilling pattern. Fig. 4 is a plan view of the horizontal fan drill pattern.

After the drilling is completed the holes are loaded with 1 1/4 in. by 8 in., 60 percent gelatin dynamite that has been packed to specifications to permit loading of the long holes. The dynamite is pushed to the end of the holes with 6 ft. aluminum tipped wooden sectional loading poles with patented couplings to prevent disjuncting of the loading poles in the holes. Each hole is primed with two detonators to assure complete detonation and detonators are placed at 50 ft. and 100 ft. from the collar of the holes. Zero delay detonators are used in all holes except those along the footwall and the pillar line. These holes are primed with No. 1 delays. This allows the footwall and the pillar line to be cleaned, thus permitting better fragmentation on the next round of holes. The burden on each shot is 8 ft.

Sub-Level System of Mining

This system, as adopted for use in the Bell mine, is in two stages—the sub-level development and long hole drilling. In the development of the sub-level system the man raises, finger raises, man drift, and stope under-cut are the same as in the shrinkage system. Inside stope raise is placed on the east end of the stope and is put up to the full height of the stope. In this system the raise on the west end of the stope is not used. This raise on the east end of the stope is used as a transfer raise for the removal of the broken stone from the sub-level drifts. A two-drum slusher is used to remove the broken stone from the sub-level drifts. At points 95 ft. and 190 ft. above the stope under-cut, sub-level drifts 8 ft. by 12 ft. in cross section are driven along the footwall from the east to the west end of the stope. At approximately the center of each sub-drift a cross, or slot, drift is driven toward the hanging wall to meet a 6 ft. by 6 ft. raise that had been put up from the under-cut prior to the driving of the sub-level drift. This raise is on the hanging wall at a full height of the stope. Fig. 5 gives a vertical elevation view of the sub-level drifts.

The 6 ft. by 6 ft. raise on the hanging wall is widened out to a 6 ft. by 12 ft. opening after the completion of the cross drift. The 6 ft. by 12 ft. opening is the starting point for the

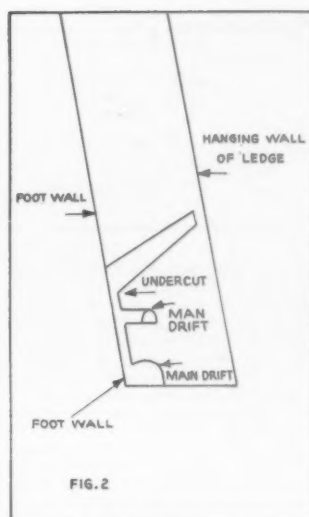


Fig. 2: Showing man drift, main drift and undercut

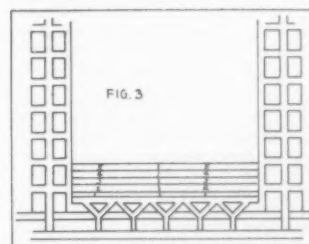


Fig. 3: Vertical elevation of a stope showing roof advance

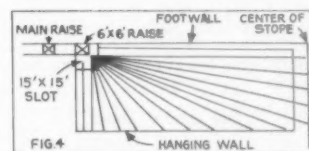


Fig. 4: Showing horizontal fan drilling

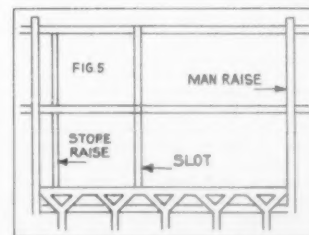


Fig. 5: Vertical elevation showing sub-level and slot

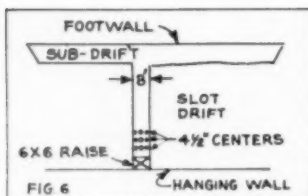


Fig. 6: View of slot drilling pattern

opening of the slot. The slot is opened up towards the footwall $4\frac{1}{2}$ ft. per round of three holes on 4 ft. centers across the slot drift. The holes are drilled downward parallel to the dip of the vein. The opening of this slot makes possible the operation of four rotary drills per stope. Figs. 6 and 7 are a plan in cross section view of the slot drilling pattern.

The long hole drilling is accomplished by setting a vertical column bar in the sub-drift and drilling holes down toward the hanging wall in a vertical plane. The holes are fanned from this setting of the vertical bar. Hole spacings are 8 ft. and the burdens are 10 ft. The depth of holes in this vertical drilling is less than that on the horizontal fan drilling pattern. On the vertical drilling the length of holes varies from 50 ft. on the shortest hole to a maximum depth of 125 ft. on the longest. Drilling of 135 ft. per crew shift is obtained on this type of drilling in the sub-levels. The same type dynamite is used for blasting on the sub-level work as is used in the horizontal holes. A change has been made to use short-period delay detonators rather than the regular delay type. Two detonators per hole are used to assure complete detonation. Two detonators are used also in view of the fact of the great variation in hole depth. The short-period delay has proved successful in the blasting of rock drilled in the vertical drill pattern. A notable decrease in vibration and increased fragmentation have resulted from the use of this type detonator.

Equipment Used

The drilling work in the drifts is done by the use of the Gardner-Denver CF-79 automatic drifters mounted on the CF-148 aluminum sliding cone shells. These machines are equipped to use 1 in. hexagon shaped drill steel. The Ingersoll-Rand jack bits used average between 75 ft. and 100 ft. per bit, with little or no loss in bit gage. The bits are re-sharpened at the mine and are used the second time in the drilling operations. The tungsten-carbide bit has been tested, but due to the extremely high footage obtained from the jack bits, and the cost of tungsten bits, it has been found uneconomical to adopt this type bit.

The Sullivan HS-15 rotary drill is used for drilling the long holes on both the vertical and the horizontal

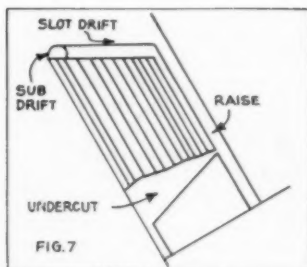


Fig. 7: Cross section of slot pattern

fan drilling. The drill steel changes used in the horizontal drilling are 5 ft. long, with steel changes made behind the machine. In the vertical holes the steel is in 2 ft. lengths and is changed ahead of the machine. The 8 ft. by 12 ft. sub-drift permitted only the use of 2 ft. drill steel inasmuch as there was insufficient room to make the change with the 5 ft. steels. The rotary drills used on the vertical fan drilling are equipped with Sullivan steel pullers.

Diamond bits of the EX size 1-15/32 in. in diameter are used for all long hole drilling. Past records indicate the greatest footage is obtained from

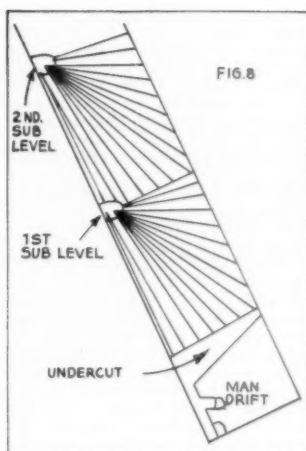


Fig. 8: Vertical fan drilling pattern

the pilot type bit. This type bit averages about 3700 ft. of drilling per bit.

The formation and character of the rock in the Bell mine have made possible the adoption of large stope and long blast hole drilling with increased safety and efficiency.

Cement Production Overseas

THE U. S. BUREAU OF MINES in the September, 1950, Mineral Trade Notes, reports that Afghanistan is planning the construction of a cement plant as a part of its economic development program. At present all cement is imported from Pakistan. In Guatemala, the cement industry experienced its largest year in 1949 when production totaled 840,856 bags of cement (94 lb.). Cement rationing, in effect since the end of the war, was discontinued in April, 1950. Western Germany also reported a peak production year for 1949.

Caribbean Cement Co., Ltd., is building a cement plant in Jamaica. The new plant is expected to be completed sometime in 1951 and will have an annual capacity of 100,000 tons of cement. Production of portland cement in Peru reached a new high in 1949, producing 1,693,708 bbl. of cement, compared with a previous record of 1,653,940 bbl. in 1948.

Switzerland reports that its cement production and domestic consumption for 1950 remain at about the same levels as during 1949, with exports moving a little higher, even though a decline had been predicted. The Thai Cement Co. of Thailand produced in 1949 an average of 10,000 tons of cement per month, as compared with a prewar level of 9000 tons per month. The Thai Cement Co. operates two plants, one in Bangkok and the other in Taluang.

During 1949 the Spanish cement industry is said to have operated at ap-

proximately 66 percent of capacity. The primary limiting factors on increased production were shortages of electric power and lack of replacement parts for machinery. The Spanish Ministry of Industry and Commerce has declared that the new f.o.b. factory price for portland cement (unsacked) will be 313 pesetas per metric ton, as reported in a bulletin, April 28, 1950. This represents an increase of 39.28 percent over the price of 224 pesetas per metric ton established for the product on May 20, 1948. The price increase, according to the decree, was based on increases in production costs due primarily to higher railroad freight rates and higher bituminous coal prices. An additional increase in price may be made by plants selling portland cement in paper sacks to cover the cost of the sacks.

New Gypsum Plant for Newfoundland

DR. A. A. VALDMANIS, Newfoundland's director general of economic development, has completed negotiations with six German industrialists for the construction of two gypsum plants on the west coast at Humbermouth, according to recent reports. The two plants will produce gypsum wallboard and pulverized gypsum for plaster and dental plates. Construction costs have been estimated at about \$2,000,000.



Some aggregates producers think they have stockpiling problems, but the operation shown at the left will stockpile about 50,000,000 tons of gravel in an area where none can be sold. This is a placer mine (gold) where the values are "free" and in the gravel, so while the latter is a waste product, it must be stockpiled. Handling 17,000 cu. yd. per day requires unusual stockpiling facilities. At right is seen a 135-ft. high surge pile of a gold placer mine in Nevada

Observations From A Year of Travel

Rock products industries to be extremely busy. Observations of concrete dam structures and in connection with stream pollution of greatest general interest due to criticism of industries and their products

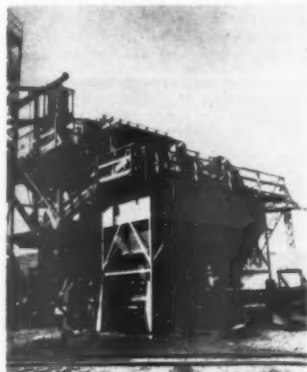
OUR TRAVEL PERIOD for this year started February 1st and concluded early in December and, as usual, was continuous and embraced most of the states west of the Mississippi river as well as New York and Florida points. The general impression gained from the extensive mileage accumulated during the past year is that 1950 will show a tonnage and dollar volume of business equal to, or greater than, any past year. Early in the year producers in some areas felt that government spending in the rock products industries was on the decline; less for such structures as hospitals, schools, and government sponsored housing projects, but the war in Korea may prove a factor to upset any earlier calculations.

Portland cement plants, especially at the close of our travel period, were operating at full capacity and even though there were new plants that got down to a production schedule in the South and West, there was a widespread undercurrent of feeling, often expressed, that even though the industry might think otherwise . . . there was a real need for more productive capacity. Several new plants for manufacturing portland cement are in various promotional stages in the west and in at least one of these, according to report, government financing is being vigorously sought. Another plant is in process of construction in Virginia.

Rumors of bootlegging, payment of bonuses, and similar cement-getting expedients were rife with such under-

By **WALTER B. LENHART**

cover payments running as high as \$100 per car. True, or false, shortages that cause such easy talk, plus a shortage of portland cement to publically sponsored jobs such as the huge irrigation projects now under way in the west, power dams, and similar public works . . . shortages that remain in a measure, unsatisfied, in this



McNary dam, Oregon side. The three steel bins receive the dewatered sand from the sand machines. Under each bin is a vibrating feeder; a blended sand is made for the off-bearing belt. If a bin overflows, the material is pumped to waste

writer's opinion, may result in a lenient attitude by the government to finance new portland cement production.

This writer believes in the principle of construction of dams to develop power that can be used to irrigate land. Some day in the not too distant future this nation is going to catch up with its food supply because each year about two million new faces come into being, and each year, due to impoverished soils and dust bowls, a considerable acreage of agricultural land goes out of use. It is highly possible that the damage from floods in California during the last weeks of November could have been avoided if the Isabelle dam on the Kern river, and the Pine Flat dam of the King's river had been in operation. Some \$28,000,000 in flood damages could probably have been avoided by the one flood. Because of the early construction stages, especially at Pine Flat project, the newly started structure itself probably was severely damaged by the flood.

Irrigation Projects

The vast power and irrigation projects that are being progressively carried out throughout the entire United States, many of which we have seen, are of such magnitude that even though we have studiously tried to collect more and more information relating to the extent and scope of the work going on, we find it hard to condense into a few paragraphs a brief description of the activities. Some are

Bureau of Reclamation projects, others are by the U. S. Army Engineering Corps, and still others are city utility and some are private utility projects. Leaving out the two latter groups, here is roughly a box score of the more important ones that are projected:

Name of Project	Number of Projects
Columbia river and tributaries	238
Colorado river and tributaries	134
Missouri river and tributaries	104
Central Valley and tributaries	24
Willamette and tributaries	19
Roanoke river and tributaries	11
Apalachicola and tributaries	4
Total	534

Practically all of these projects are dams with reservoirs and include power development. The above tabulation does not include McNary dam on the Columbia river, a \$227,000,000 project in itself. To the list could be added the development of the Savannah river, the Alabama-Coosa river project, the Genesee river, and others.

The first five projects listed above will provide for irrigation of about 11,500,000 acres of new land, and will provide supplemental water for an additional 8,700,000 acres. Over a hundred billion kilowatts of electrical energy annually is ultimately to be developed.

It is difficult to get estimated cost data for, in most cases the funds are appropriated as needed, so cost estimates made in 1946 or 1947 do not mean much. However, the estimates made in 1947 for the Columbia river totalled \$5,598,494,000. Estimates made in 1946 for the Colorado river totalled \$5,598,494,000. Estimates on the Missouri river, because of their size mean expenditures on a comparative big scale. These projects are all set up to be self-liquidating with funds returnable through sale of power and water but even if they were not self-liquidating they will be national assets. Here is one example of what can result from these expenditures. The Central Valley project in California will, by 1960, have cost an estimated \$1,800,000,000. This is less than the cost of the first atomic bomb. Some 50,000 new farms are planned to come into being that will produce annually \$200,000,000 and this is estimated to make a living for 250,000 people, exclusive of migratory labor. With manufacturing and service industries that would complement this, 600,000 to 700,000 people would be employed as a result of this one project. On this general subject, we are advised that every month there is streaming into California alone enough people who intend to reside there to populate a city the size of Bakersfield, Calif.

Project these figures into the beneficence of almost 20,000,000 acres of irrigated land, to say nothing of the limitless areas of improved pasture lands, and one begins to get an inkling as to what the distant future holds for our bread basket. These great

projects will help in providing for growth.

Pumping Plants

We took a quick look at the world's largest pumping plant, which is lifting waters into the Delta-Mendota canals. The Tracy pumping plant, as it is called, is a part of the Central Valley project. This pumping plant received a considerable amount of publicity because here was used precast concrete pipe that is the largest precast pipe in the world to date.

Three pumps deliver a total of 4600 cu. ft. per second into the canal, which is concrete lined for most of its 120 miles of length. The pumps lift the water 200 ft.

The grand-daddy of all these great irrigation projects, now being constructed, is the one now being pressed forward by the Bureau of Reclamation, in Central Washington, and because direction of this project stems from the Bureau's offices in the little town of Ephrata, we are inclined to refer to it as the Ephrata project. A little over a million acres of flat and fertile land is to be irrigated. Three great canals, each as large or larger than the All-American canal on the Colorado, will each carry some 16,000 second feet of water. These canals will be roughly 500 miles long and their size can be gauged by reference to the pictures we show of the concrete placing machines that each place, and finish, 1000 to 1500 linear ft. of canal per day. We saw at least three in operation. The water to flow in these canals will be pumped by 12 pumps each powered by a 65,000- (sixty-five thousand) hp. motor and each will deliver some 720,000 g.p.m. through 12-ft. discharge lines. When this pumping plant gets started it will take the crown from the Tracy operation and become the world's largest. These are by far the world's largest pumps. Ten of the pumps will be in continuous service and two will serve for spares. The concrete pipe used as siphons to carry the waters across valleys and ravines are again

the world's largest, so large they had to be cast in place and by specially designed machines. The little towns of Ephrata, Moses Lake, Soap Lake, are about to burst forth with aggregates plants, concrete pipe plants and concrete block plants to supply the needs of this empire in the making. The total cost of the project is said to be some \$300,000,000, so, for a million acres, that is \$300 per acre. We wonder if some of the swamp lands in Florida, Georgia, Louisiana and Mississippi could not be reclaimed at less cost and to serve the future as a giant bread basket. But if the people in the South want this land reclaimed their thinking will have to be on the scale of the Westerners, which apparently have no limits.

We might take more heed of what a famous agronomist said about soil erosion. He said, "A good soil won't erode." He developed this thesis by pointing out that impoverished and robbed soils were the only ones that eroded and if adequately revitalized by use of agricultural limestone, stone dust, slag dust, granitic dusts, and similar materials, plus other types of fertilizer, there would be no such thing as withdrawal of soils because of the vegetation. We do not know how much this fertilizing program would cost, but we would hazard a guess at about \$15 per acre. So maybe we can add vast acreages to our national resources by this far cheaper, but equally effective expedient.

Visit Ten Dams

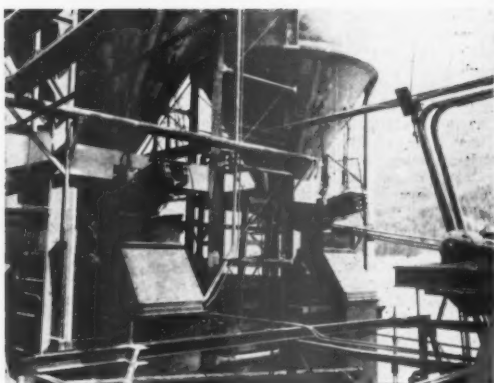
It takes a long time for these great Western projects to come to maturity; the Imperial Valley project was first proposed in 1860 and in 1911 the Imperial Irrigation District was organized. Hoover dam, Davis, Imperial, and Laguna dams are all a part of, or related to this irrigation project. The Central Valley project started before World War II and it will be at least 1960 before it is completed. The Ephrata project will take a decade or longer to complete.

Besides older concrete dams which we inspected in order to observe their general qualities, some ten dams under construction were visited. We take in these projects because an aggregate plant is always involved and those plants usually embody the latest aggregate processing techniques, and besides these dam builders are thinking ahead in concrete technology. At some of these dams under construction our visit was too early, for at such projects as the Chief Joseph dam on the Columbia below Grand Coulee, the project was in the early (so-to-speak) road building stages, but at McNary, Detroit, Big Creek No. 4, Hungry Horse, and others, construction was in reasonably advanced stages and ROCK PRODUCTS has already, or will soon publish, articles covering the aggregates and the features of the concrete for these projects.

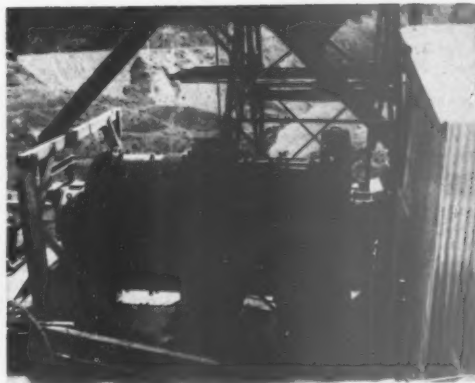
In all these active projects, cooling



The two bottles at left are 50 and 35 years old, respectively, and once were clear and transparent like the bottle on the right. The constant bombardment of the sun's rays in the desert areas of the Southwest changed the color to a deep purple, thus indicating that the sun, plus heat, can make physical-chemical changes in an inert material



Here is shown an 8- x 12-ft. peripheral discharge rod mill at the Detroit dam construction site



Part of the sand cooling assembly that may set a pattern for ready-mixed concrete

of the aggregate and/or the concrete was considered of importance. Detroit dam set a pattern that, if it ever should become a trend in the concrete operations, it will be an eye-opener. All the aggregate, sand and coarse, and the portland cement were being cooled artificially. The larger sizes of aggregate were being cooled by ice water inundation in silos, and the sand was cooled in screw-type conveyors with ice water flowing through the flights. The portland cement was being cooled through passage of ice water through the conveyor flights. At another dam, the coarser aggregates were being cooled by cold air. Just how mechanically efficient the water-cooled conveyors will prove is something that can be watched with interest.

In sand production, the blending of several sizes of sand to make a concrete sand was another eye-opener and most all of the operators were concerned with the problem of getting more fines in the end product. Accordingly, if one is contemplating bidding on the sand to go into a government-sponsored project, especially one under the direction of the Corps of Engineers, a thorough study of all the data we hope to publish on the general practices used should give valuable clues as to what such a prospective producer would have to do to meet requirements. The sizes in the minus 100- and 200-mesh range were the difficult ones to attain and one reason for this was the difficulty in feeding accurately a prepared wet sand of this fineness to a blending belt. Coarser sands were being fed in pre-determined amounts to the blending belt by such expedients as electrically vibrated feeders. At McNary, "blow-sand" was being fed dry into the blend. One very simple solution of this problem was observed at a commercial plant near San Diego, Calif. and, in the August, 1950, issue of *ROCK PRODUCTS*, we published a detailed account of the steps used at the plant of Caudell & Johnson. At a new

phosphate plant similar devices to those used in San Diego were being used to make a fine sand-slime separation and these, too, could point to a simple and efficient way to solve this difficulty. The phosphate technique will be published in an early of *ROCK PRODUCTS*.

The irrigation projects on the Gila, and in the Imperial-Coachilla valleys in Southern Calif., were again visited and only until this year has water been delivered to some sections of the Coachilla valley. The concrete pipe going into this one project involves a steady stream of large capacity trucks streaming from adjacent cities into this land of promise in spite of the fact that the area is well dotted with concrete pipe plants that appeared to be busy. It is in this area that a new cement plant is being proposed for construction.

ROCK PRODUCTS has been quite active in promoting the advantages of a surge pile somewhere in the aggregate processing flow sheet. One argument that has been presented for their adoption has been based on the thesis that the first segment of the operation, up to the surge pile, could operate during a slack period, and while the finish end of the plant lay dormant. When the surge pile was full, the plan would be to move the men up to the finish end, and thus cut labor requirement. But our travels have disclosed that this theory is not sound, at least in some areas, because the unions said "No." We still hold that surge piles have many advantages in keeping a plant uniformly cooled and in some regulation of character of feed, and we will continue to expound their virtues.

In our travel report covering the year 1949 we mentioned indications pointing towards a large use of pumice, and particularly to be used in concrete to ward off atomic radiations. During 1950 we tried to prove this point and met with little success except that some work was being carried out under secrecy regulations in the

Southwest. From material being published in the *Chicago Tribune* early in December of 1950, this general subject is receiving an airing along with its political implications.

A considerable amount of time and travel-miles was spent gathering data relating to the control of rejects from the metal mining industries in the west and these data are being published serially in *ROCK PRODUCTS* to suggest way in which rock products producers might tackle the problem of rejects and stream pollution. Requests for re-prints and additional copies are coming into the office from all over the world and it is gratifying to note that a large number of these requests are coming from the large metal mining companies as well as from rock products producers.

Role of Ready-Mix

The part that ready-mixed concrete plays in the rock products industries is a very large one and a phase that is growing by leaps and bounds. In the Coastal areas, small towns of a couple of thousand population, or even less, can now usually boast of a ready-mixed concrete operation. It may, in some cases, involve a couple of old battered up mixer trucks, loaded by make-shift equipment, but nevertheless, these operators are in the business, and it is our guess they are there to stay. Not all of these operators have their own aggregate producing facilities, but in time they will. On the other hand, very few aggregate producers are not producers of ready-mixed concrete. The wide-spread absorption of the ready-mixed concrete business by the rock products industries has, in a measure, changed the thinking processes of the owners and operators of aggregate plants, and there is a growing thirst for knowledge and information regarding concrete with emphasis on the durability of concrete. These men have problems, the solution of which, are as yet, not being met by the concrete technologists. They are a little weary of read-

ing countless volumes on concrete, only to go back to their home towns to be beset by customers who want to know why their concrete is cracking and not doing the job they had hoped it would do. They are thinking in terms of research, their own researches, and not that of some distant organization. This thinking about research makes a neat little package all its own and at first we were a little bit skeptical about the plans of a ready-mixed concrete producer in a small Nevada town, or one in a small Oregon city, or one down in the "sticks" of the Southwest. We were a bit skeptical as to what such small companies might accomplish with a so-called research laboratory, in thinking of the well-staffed and more pretentious ones nearer the larger industrial centers. This traveler had the idea that the large research organizations had the money to buy the best brains, the best equipment, and to organize their work on a vast scale, and, if these big fellows could not find the answer, how could one expect the little fellow whose capital is limited, who may lack the higher technical training that such work may require to ever find out much that was new in concrete, or in portland cement, or in durability. We even voiced this opinion to a top executive in the metal mining fields of the west, where we had gone to study tailing control methods and this is the response we got: "I do not know much about concrete but I have been all my life connected with the smelting, concentration, and mining of the non-ferrous metals including gold, silver, lead, zinc, copper, etc." Then he gave this thought-provoking comment, "There has never in my lifetime of 40 years as an operating head been a single, solitary advance made that sourced from anyone, anywhere in these complex industries, who was in the higher executive brackets. Every advance has come from the ranks, from the men down in the plants who were in direct contact with the work. They had a problem. They took it to bed with them at night and they awoke with it the next day. By trial and error, they contributed the clues that unravelled the mysteries. Once the man on the job had indicated the direction of the answer, then the brass moved in to take it over."

We went away from that district with the conviction that each producer, large and small, of ready-mixed concrete, should have some facilities, crude though they might be, to help them seek the answers that the industry wants and needs. In our travels thereafter we discussed this subject of research with many producers and we got such responses as: "Yes, there has been a lot published on concrete, but it's mostly about such structures as great dams. I am not interested in dams. I'm interested in garage floors, curbs, sidewalks. Tell me more about these little jobs."

These are not necessarily my sentiments. I am only the reporter who

has tried to collect expressions and thoughts relating to trends within the rock products industries and to iron out some of the rough edges and to present them here so as to indicate what is going on behind the national facade. It may not be pleasant reading to some but we hear men in high places make such statements as "The best concrete is that without any cement in it," and another says, "Our outfit, in a dam to be built, may replace five million cu. yd. of concrete with an earth filled dam," and yet again, "I heard that so-and-so was playing with a scheme to use bituminous concrete on a dam structure." When one gets these sentiments shot at him from all angles we are in hopes that the little ready-mixed concrete producers will get their little laboratories to functioning, will take their problems home and arise in the morning with them, and somewhere, somehow, the little thread of knowledge will expose itself and the ball of mystery will be unrolled so that the old slogan of "Concrete for Permanence" will have added significance.

Search for Durability

This search for the answer to the durability of concrete has taken some strange turns. My part has been as an observer and the first observations were here jotted down almost 30 years ago and the interest was, I must admit, rather superficial and when one of our senior editors heard that I was soon to take off for the west, he said: "If you go near the Elephant Butte dam on the Rio Grande north of El Paso, I wish you would take a look at it and drop me a line as to what you see. And if you can, there are a couple of bridges at Little Rock, Ark. that I wish you would survey." Before going, I brushed up somewhat on the latest data on concrete such as the expansion, compatibility and reactive aggregates theories. At the start of this year's trip I was thoroughly sold on the validity of the reactive aggregate theory. The Little Rock bridges and Elephant Butte dam inspections planted a seed of disbelief, and until someone in high positions can re-sell me on the truths of the reactive aggregate theories, I must be convinced.

The strange turns that a highly theoretical pronouncement, such as the reactive aggregate theory make, can be illustrated by two jolts that evidenced themselves early in the trip. The first jolt emanated from learning that two engineers, one associated with a government-sponsored organization, and the other a city engineer, had gone into a certain producer's aggregate producing plant and unbeknown to the owner, had taken two grab samples off of a conveyor belt. They had them assayed for reactivity with findings that boded no good for the old time producer who had an excellent performance record well into the millions of tons. Whether or not

a couple of buckets full of aggregate is a fair sample for a product with a million ton service record is not entirely beside the point, or whether the deposit was rejected by other local authorities who based their rejections on this skimpy sample, also is not entirely beside the point, but to reject any aggregate because of what is to many a very controversial theory, and a theory that is, to this writer, totally inadequate is something for all producers to worry about. For you may be next and, if you are, I hope, in these paragraphs, you will find something to shoot back at the system of logic that bases its very existence on the "This concrete failed . . . That concrete did not . . . Both use the same cement, but different aggregates," schools of thought, a system of logic that has not resulted in much recent progress. It gave birth to the reactive aggregate theory. It gave birth to the exclusion of fines in the aggregate, only to have the theory replaced by one demanding more fines, and now there is evidence that indicates fines again may not be desirable. It gave birth to going overboard to artificially cool all mass concrete and now indications are that a reversal is on the agenda, and that excess cooling is not the answer. Be that as it may, it is this traveler's firm belief that time will prove the reactive aggregate theory to be just another dream.

This same type of logician, when pointing to an important dam structure in the Southwest that is in bad shape because of "reactive aggregates," falls back on such statistical data as ". . . on the cement stone 2250 complete chemical analyses, 27,000 briquets, 4500 turbidimeter fineness tests, and 4500 pats for time of set and soundness tests . . ." No mention was made of the thousands and thousands of cylinders that were probably broken over the years that it took to build this structure, but the record says 6 in. was the top size of aggregate used, and 6-in. by 12-in. cylinders were broken in the test work. We wonder how a 6-in. diameter piece of aggregate would look in a 6-in. diameter cylinder. This test work was in 1937, yet the dam, in my all-star line-up, trails sadly.

My second jolt came when a ready-mixed concrete producer in the west told me that he was paying a premium of 10 to 20 cents per bbl. for a certificate that testified to the low-alkali content of the portland cement. Mark the italics, for he was not paying 20 cents a bbl. for a low-alkali cement, but for the certificate. The producer was thoroughly convinced in his own mind that the cement manufacturer could not make anything but a low-alkali cement if he wanted to. He had been making a low-alkali cement for years and years, according to this concrete producer, and some were beginning to wonder if it was not to some cement manufacturer's advantage to help carry on the myth of reactivity.

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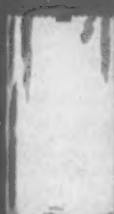
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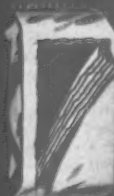
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Need for Study

Much of the talk regarding reactivity stems from findings related to the disintegration of concrete in some of the nation's important dams, especially some in the Southwest.

We would like to see some different branches of science take an interest in the general subject of concrete and its durability, and to send some of their staffs to look at the various classic examples of concrete failures. I think they might come up with some new and interesting explanations. For instance, I would like to see a meteorologist make the jaunt. A meteorologist is a scientist versed in subjects relating to weather, air temperature, heat, humidity, and moisture.

I would like to have him visit such dams as Coolidge in Arizona, Parker dam on the lower Colorado, Gene Wash and Copper Basin dams in the same area, on the hottest days in the desert summers and if he only does one thing, namely, take a temperature reading, *in the sun*, of the surface of the concrete he finds there, he will have added possibly something new to concrete literature. I say, possibly new, because to date I have been unable to find any references to temperature in the sun. The readings are all in the shade. The concrete is in the sun, though. I have written to several governmental agencies in Yuma, and Needles, Ariz., and other "river" offices and am really amazed to learn that no readings are available and the best I could get was "estimates." What has this got to do with concrete? Well, the highest "in the sun" estimate was 160 deg. F. and another was 140 deg. F. on the hottest days.

I tried to pinch hit for this meteorologist so I purchased a cooking thermometer, and went through the hocus-pocus of calibrating or checking it in the kitchen of a friend who had a gas stove and a supply of cracked ice and then hied for Parker dam and the Lower Colorado. But unfortunately the weather waits on no man and when I was there it was on one of those beautiful balmy days. My thermometer read 98 deg. F. in the shade. The river water was 72 deg. F. and in a little concrete alcove where the sun was blasting away the reading was 140 deg. F. Now my other exhibits show that in the area the ambient temperatures go as high as 132 deg. F. in the shade. I am wondering what the *in the sun* reading would be on these terrifically hot days? My estimate would be in the 170 deg. range, and some day I hope to go there and see if I can't literally fry an egg on the surface of that concrete. During one hour that concrete is in the sun, the next in the shade; one face is cooled with water and the other is hot. Just how hot is 140 deg. F.? When this phase of the subject is discussed with those directly interested, with a wave of the hand they point out that recording thermometers have been buried in the concrete and that



Tracy, Calif., pumping plant a short time before it began operations. Now the largest in the world, it will be exceeded by the plant at Grand Coulee, Wash.

even the seasonal change is only a matter of a degree or two. But regardless of what these experts say, I still hope to try and fry an egg on the surface of some concrete in the vicinity of Parker dam when the temperature in the shade is 125-130 deg. F., and when the concrete is in the sun.

I would like this same meteorological traveller to let his thought dwell on the subject of humidity. How fast does water evaporate on these same hot days. I am told it rains there about 3 in. per year, and that this rain can (and often does) all fall on a single day so the rest of the year the air is sucking water out of anything available, even from the concrete. I do not have any scientific evidence to offer as to the rates of evaporation so I can only go back to the years I lived there myself and watched the women in camp hang out their Monday's washing. In that simple desert operation, the final rinse was not removed at the wringer. The dripping wet clothes were hung out "as is." They did this because it made fewer wrinkles in the final product, but on those hot, dry days those dripping wet clothes would dry out in a matter of minutes. And of what interest is this to concrete? I would like to have the suggested scientist's opinion as to the amount of free water in the decorative and ornamental features (balustrades, steps, etc.) because, as I understand it, the reactive theory requires water as one of the vehicles to transmute the alkali portions hither and yon, and I suspect he would report that this part of the concrete "was bone dry," yet, these bone dry portions are about the messiest looking concrete that some of these dams have to offer.

Following the meteorologist I would like to have someone take electrical conductivity readings of this bone dry concrete that failed "because of the aggregate" and perhaps make a report on the impracticability of free ions, atoms, molecules, and what not, moving to selected spots in the con-

crete where they gel, expand, and blast concrete into oblivion. Just as a practical consideration I suspect it would take about a million years for the ions to migrate if water is the carrier, because "there just ain't any such animal" in these small, ornamental features.

Perhaps the same scientist could give a play by play description of what happens to concrete when it dries out thoroughly, in the periods long after the allotted wet curing period, because there is such a marked similarity between plain old (dried out) mud cracks and these so-called pattern cracks, that one wonders as to the reason. We might point out that the mud cracks do not have any cement in them.

Time is an important aspect. How long does it take for the reactive phenomenon to get into high gear and to show itself? It would be years and years. I have been led to believe, but on one of these "reactive aggregate" structures (a dam) I asked what the concrete looked like on his arrival. The answer was, "About the same as it does now." Bone dry country, bone dry concrete, hot as the hubs of hell and a reactive example—all in two years. The dam looked then like it does now, and it looks bad.

Effects of Heat

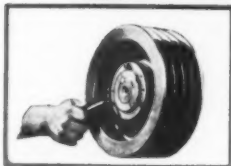
Another type of scientist that I would like to see go on such a proposed trip would be someone versed in the manufacture of glass. I would like to have his slant on what can and does happen to concrete in these dry, hot areas. If a plain beer bottle or whiskey bottle of glass can undergo physical-chemical changes in that area, of such a nature as to cause the water-clear glass to change to a deep purple, perhaps that same sun-light can do something to concrete. One of the illustrations we show here is a photograph of three bottles. The two at the left are a deep purple and got that way from just being out in the sun where the heat, plus radiations

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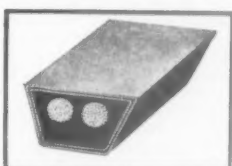
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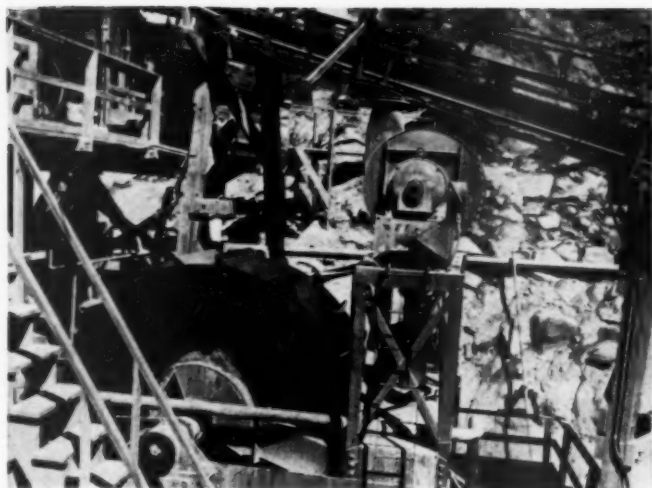


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Sand wheels of the vacuum type here shown may find a use in the cooling of fine aggregates for mass concrete. (See June, 1950, issue of *ROCK PRODUCTS*)

that I do not attempt to understand, made these pronounced changes in the glass.

The two glass specimens were contained near Tonopah, Nevada, and while there we saw a flat-shaped bottle with this same deep purple color. The bottle had evidently been resting for years on a rocky surface. The lower portion of the bottle showed evidence of plastic flow, or deformation under the intense heat bombardment. If this is the true explanation of what happened to that particular bottle it does not follow that concrete would act in a similar manner; we only cite this to illustrate that the intense sun's rays acting over long periods of time do make physical-chemical changes in an inert material.

These two specimens were shown to a man who was a consulting engineer to several of the glass container manufacturers and he told enough about those two bottles to write a separate article; their age, how they were made, where they were made, etc. Perhaps such a technician could add some vocal fuel to the fires of concrete durability.

Another scientist that we would like to see make such a trip would be a biologist, the branch of science that treats of living organisms, and especially a man well-versed in the subject of fresh water microscopic organisms. This desire comes from a statement made that the speaker, personally, "... had picked blobs of silica gel from cracks in the concrete ..." I honestly believe the man did pick blobs of gel (and the blobs might be high in silica) from the cracks in a dam structure.

From other sources, and we quote, "Exudations are occasionally found when the concrete is subjected to moist conditions. These exudations oc-

cur in small blobs of jelly-like substance which exudes from the concrete when fresh and moist. It is very soft but on exposure to air the substance hardens and generally carbonates rapidly. Chemical analysis shows it to be a silica, or silica gel." The material (we assume he means dry) has a silica content up to 80 percent in some cases, while the total sodium and potassium content may vary from almost negligible to as high as 26 percent or more.

We would like a little more information on the nature of this gel because in the *Encyclopedia Britannica* we ran across the name "*Diatomacia Bacillariophyceae*" and it developed that we were reading about diatoms. The writer had thought diatoms, the parents of the well-known diatomaceous earth, was a pre-historic animalculae and was extinct, like our dinosaurs; but here is briefly what it said, "microscopic unicellular or colonial algae, cell walls strong with silica, are plants, 5500 known living species, like moisture and light, live in moist soils and cling to rocks, like cold water best, some are free floating gelatinous (italics are mine), simple and branched, ribbon-shaped colonies or zig-zag chains and sometimes a gelatinous envelope."

I would like to know more about that subject and our biologist might become facetious and point out that the reason we find dry remnants of silica gel around the more soluble silica rocks (opals, chalcedony, flints, cherts, etc.) was that the little *diatomacia Bacillariophyceae* was hungry so he centered on a good old soluble piece of silica where he eventually colonized, lived and died. At any event the biologist's dissertation might relieve the hum-drum lives of some of the concrete technologists.

I would like to see a chemist and a mathematician look at these structures and then to jointly sit down and make a calculation based on the area of the sand and aggregate going into a cubic yard of concrete. I would want just the simple total area of the aggregates and to revolve this into the more general terms of "square centimeters." Then these two could go back to the history of some particular reactive concrete and find out what the alkali content was, and, the number of sacks of cement used per cubic yard. Thus, and for illustration, they might find that a three-sack per yard mix was used and the cement had 0.6 percent alkali in it, or 1.8 lb. per cubic yard. This was dissolved, we will say, in 200 lb. of water and that liquid then filmed the surface of all the aggregate and cement particles. I am wondering how many ciphers there would be in the answer when it was converted to "grams of alkali per square centimeter of aggregate." I will hazard a guess that there will be at least three ciphers, something of the order of .00005 grams per square centimeter of area. In other words, these scientists (not me) would find that the alkali available on the surface is so dilute that if a gel did form it would be so thin, microscopic, and futile in the pressures that it could exert, that the voids in the aggregate, and/or the voids in the dry concrete could easily absorb the mythical expansive film that is supposed to destroy our dams.

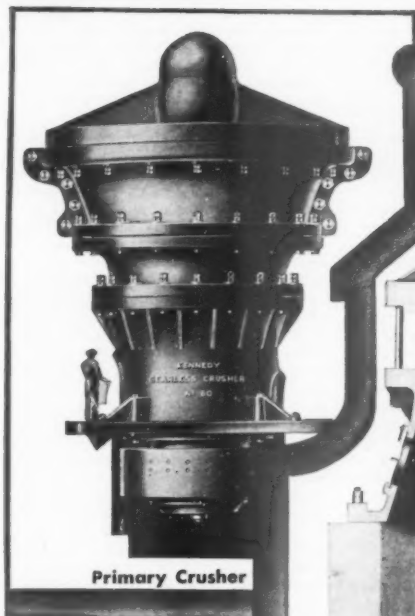
But aggregate producers are not practical men. They just pour concrete, so to make the myth stand, science has to bring in other hard-to-understand phenomena; and to lose all practicality and fall back on such terms as "osmosis," "maximum and minimum and optimum and pessimum" amount of the harmful rocks. I am so lacking in the scientific skill that it should take to refute these miracles of reaction, that I will simply grant that osmosis does play a part; that some sections of the alkali molecule throughout the entire mass do migrate to favored sections in the concrete and there the alkali piles up in sufficient concentrations to actually react with the silica rocks, form a gel, the gel swells up like a balloon and cracks the concrete. I think my chemist and my mathematician might freely admit that some spot in the mid-section of the concrete could become inhabited by the gel and it will split the concrete. But at that point I think they would say "finis" to the reaction. They would, as a corollary, possibly point out that the resulting force was not an explosion and that it was just a steady, non-holdable pressure that split the concrete and at that point the life's cycle of the gel (and its parents) was ended. This same alkali could not do another set of whiskers and move over into the northeast corner of the concrete, there gel again until the mass of concrete was so badly split that one could not throw an



LET'S

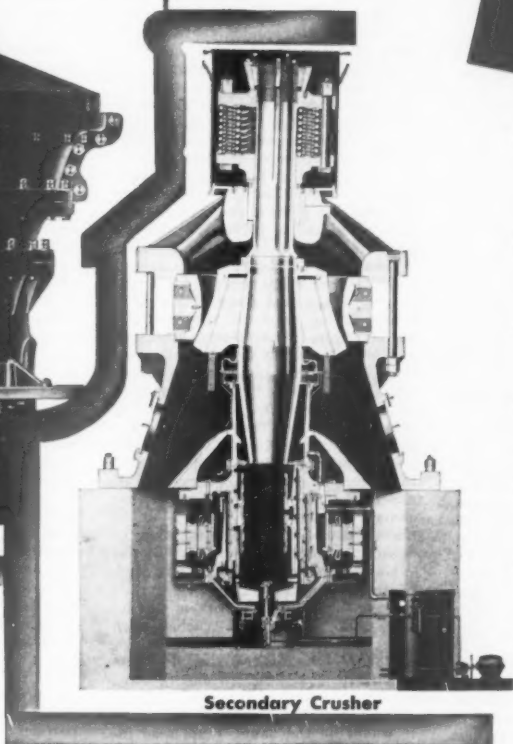
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automobile key ring on the face of the concrete without touching two or more cracks. But that is the thesis that the poor aggregate producer has crammed down his throat, and with only one or two percent "reactive aggregate" available to start with.

Project Examples

There are three dams in the vicinity of Parker dam on the lower Colorado that I would like these scientists to study carefully; they are (1) Parker dam (2) Gene Wash, and (3) Copper Basin. They are all within a few miles of each other and all are a part of the great Metropolitan Water District of Southern California. They were all built about the same time, by same contractors, of the same aggregates, etc. They are all acting alike. They are moving; they even "breathe" and the concrete is said to be bad because of "the aggregate." The first mentioned dam is where tourists can see it easily and the second dam might be in a similar category. But Copper Basin dam is so located that one has to go through locked gates, and take a locked boat to get to the dam, or walk across a terrain that defies description in its jagged character. So, on the Copper Basin dam, the powers that be, have placed many accurate bench marks in the surface of the concrete. Every month, since 1938, the engineers go to this damsite and take readings with their transits and levels and the dam is said to have "grown" about $2\frac{1}{2}$ in. in height and tipped upstream some five or more inches, "due to the aggregate." In looking over the chart that has been prepared showing the yearly growth of this dam, one is struck by the uniformity of the yearly growth. Each year it goes up a certain distance (on the chart), drops back a fraction, and, next year goes up almost an equal amount. Expansion, growth, internal expansion, silica gels, these are the explanations, but again, I think the scientific teams might grant that the first expansion was partly due to osmosis. They would grant that the structure would be pushed upwards roughly one-fourth of an inch (net gain) during that first cycle (and note well that it took only a year to do it) but I doubt that their fantasies would let them report that the alkali would re-orient itself and re-gel, again and again and again.

I would like to see a mineralogist make this inspection trip who would be a scientist with no ax to grind in support of any pet theories, and let him pass judgment on the aggregates used such as at Parker dam.

For quite some time, the writer had the impression that the aggregate used on Parker dam was a felsitic material. We find that a felsite is defined as a dense fine-grained, igneous rock. But our inspection revealed the information that the aggregates used were river gravels and river sand taken from a tributary of the Colorado above the damsite, and, which now is all

deeply covered with water. No adequate samples of the sand and smaller aggregates remain near the project, however, a large pile of coarser aggregate (in the 3-in. range) is a left-over from the construction days. I carefully examined this pile of material for strange looking rocks including cherts, chalcedonys, flints. I found nothing out of the ordinary and not much different looking than the aggregates used on Davis dam and Hoover dam, both up-stream from Parker. The material was made up of well-rounded river gravels that nature had sorted out over the eons of time as being its most durable. Those igneous rocks that I could identify were more granitic in character and definitely not dense and finely crystallized.

I would like to see someone go to these great dams who was skilled in the use of a ruler that could be read down to a thousandth or a ten-thousandth of an inch, or even less. I would suggest that he take an ordinary piece of gravel (or crushed stone) and for this purpose we will assume that he picked a perfectly spherical piece of gravel 6 in. in diameter. To be exact, at 70 deg. F. it measured 6.0005 inches in diameter. This scientist will place that piece of gravel in a box, or jar, or closet, where it will not be affected by erosion or weathering influences. Then every month or so he will take that piece of gravel out and again measure it, taking due note of the temperature at the time of measurement. At the end of say ten years, at exactly 70 deg. F., what do you suppose will be the diameter of that piece of gravel? You guessed it, exactly 6.0005 inches. Now, apply that same reasoning to a piece 3 in. in diameter, and to one $1\frac{1}{2}$ in., then to $\frac{3}{4}$ -in., to 4-mesh, to sand.

Next suppose that we took enough of those 6-in. (or rather 6.0005 in.) pieces of gravel and laid them side by side until they firmly touched each other, until we had a total length of 4,173 ft. (the quoted length of an important dam). At 70 deg. F. this theoretical length of spherical donikers was as indicated. Ten years from now it would be the same. I am also inclined to think that a similar string of 3-in. spheres of gravel would be the same length, that a $1\frac{1}{2}$ -in. row, a $\frac{3}{4}$ -in. row, even sand, would remain exactly that length at that temperature. But this important dam, according to the literature they hand out to us tourists, has shrunk exactly 9 in. If we were to take that same theoretical row of coarse aggregate, plus sand and put them in a container, mixed like in concrete, in a box 4,173 ft. long (at 70 deg. F.) it would still be exactly that long ten years from now. But, if we add some clay to the blend, on drying, the length would be less, and the overall results would be the so-called "shrinkage cracks." The reason is simple enough because clay, when wet, is colloidal by nature. It occupies more volume wet than dry

so when the water leaves the colloidal portion, the mass shrinks. The aggregate does not expand and contract until something has been added to it.

I would like to see some scientists versed in the general subject of "fatigue." Fatigue is defined as "weariness from labor, or the action which takes place in materials that deteriorate and fail after a repetition of stresses." When one is in the inspection tunnels of Bonneville dam, and that structure does not rate too high in my all-star line up, one can feel the minute vibration of the vast water volumes cascading through and over the structure. Can fatigue develop in concrete that has been mercilessly bombarded by "high in-the-sun" temperature. I think this type of scientist would dig up something useful and interesting to say about the violent jerking of water out of concrete. We have noted that the under-sides of bridges is usually much better than those exposed to the sun. The occasional wet up-stream face of a dam is usually much better than the downstream side which is essentially dry—sun exposed.

Another observation might be pertinent to this same subject and it stemmed from accumulated data relating to one of the older dams. The speaker said in substance; "the reason we do not have deterioration of the surface of the up-stream face is the fact that it was hand-tamped and hand-rammed; deterioration occurs on the down-stream face primarily because we do not get good compaction there." This traveller notes instance after instance of the same observation but somehow or another got the idea that the up-stream face was wet, at least wet more often, and that the down-stream face was exposed to the sun and is usually dry.

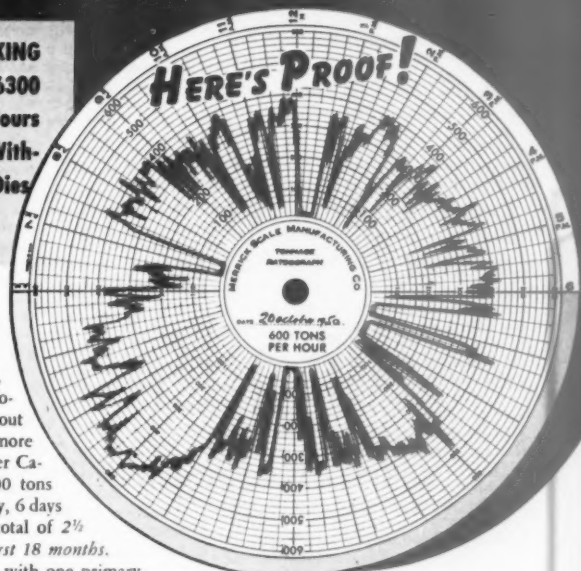
Arrowrock dam on the Boise river near Boise, Idaho, is another sun-drenched structure, particularly on the down-stream face. It is located in a desert area where sun temperatures could be high and when we looked at the dam we were impressed with two facts; one of the balustrades was pattern-cracked and the top surface of the road-deck was in poor shape, but the down-stream face was in excellent condition. This upset things for awhile until we learned, while perusing literature on the subject, that the down-stream face had been recently blanketed with a 2-ft. thickness of new concrete because the surface of the old face was badly disintegrated.

Dorena Dam in Oregon was built, according to one competent authority, "of the worst aggregate in Oregon, if not the worst in the United States." We described the processing of this aggregate in the October, 1949, issue of ROCK PRODUCTS and at the time of our inspection construction work was about completed, so the project, at least as far as the lower portions are concerned, is now in its third year.

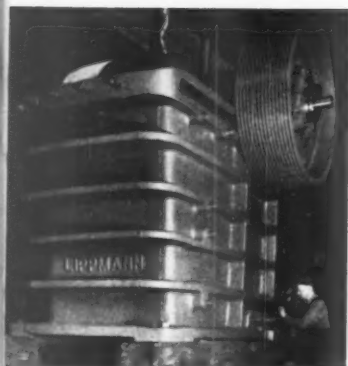
Reduces **2½ MILLION TONS** of Blast-Run Niagara Limestone to Minus 3 in. **IN 18 MONTHS . . . WITH ONE CRUSHER!**

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Aggregate Producer
in Canada . . .**

**Rock-Ravenous 36 x 48 GRIZZLY KING
Jaw Crusher Often Produces 6300
Tons per Day . . . Works 20 Hours
a Day, 6 Days a Week With-
out Shutdowns! And Jaw Dies
Haven't Even Been Turned!**



Actual weight chart of a typical day's production, recorded by scale under discharge conveyor, is proof that Grizzly King's output reaches 560 tons per hour.



In complete Lippmann plant, Miron Bros. makes six sizes of stone — everything from ag-lime to ballast rock.

Two years ago the site of the Miron Bros. plant at Ville St. Michel, Quebec, was a farm. Today they are turning out what is believed to be more aggregate than any other Canadian producer — 300 tons per hour, 20 hours a day, 6 days a week—the amazing total of 2½ million tons in their first 18 months.

And they're doing it with one primary in a plant that's completely Lippmann-engineered and Lippmann-built . . . from the 36 x 48 GRIZZLY KING Jaw Crusher, the world's highest capacity overhead eccentric, through scalper, belt conveyors with Life-Sealed Ball Bearing Idlers, Screen-All Vibrating Screens with perfect-circle throw, and Roll Crushers.

They're feeding hard, blast-run Niagara Limestone up to 36 in. directly to the GRIZZLY KING, with the discharge opening set down to 3 in. And the crusher actually idles a good share of the time!

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There isn't another crusher built that approaches GRIZZLY KING's capacity — extra long jaws, engineered crushing action, complete oil lubrication and alloy steel construction add up to the rock-eatingest crusher on the market today. And its low-maintenance operation is proved by the fact that Miron *hasn't* even turned the jaw dies after 2½ million tons.

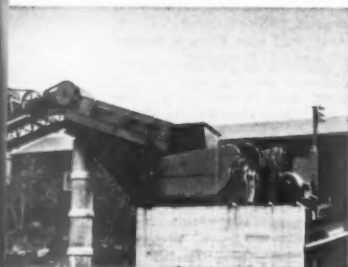
You, too, can pile up extra profits with the world's lowest-cost-per-ton-crushed

rock and ore machinery. And Miron is doing all this with an investment of only \$125,000 in super-capacity, low-cost Lippmann equipment.

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2008

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1100), Screen-All Vibrating Screens
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izers (1160), Life-Sealed Ball Bearing
Idlers (1410), Gyra-Gnome Secondary
Crushers, Circuit Rider Self-Propelled
Crushing Plants, Portable Washing
Plants (1650), Apron Feeders (1450).



Other Lippmann equipment at Miron: two 48 x 24 roll crushers, five 5 x 12 Screen-All vibrating Screens, 591 ft. of belt conveyors with Life-Sealed Ball Bearing Idlers.

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A second look at the concrete during the past summer showed it to be in excellent shape, so if the aggregate was as bad as indicated, the processing technique may be a part of the answer. However, this traveller does not lean in that direction in the least, but would rather hope that if Dorena, in time, turns out to be an outstanding concrete job (with a bum aggregate), the mystery of why it did will be one of the problems for the small research laboratories to delve into.

While at a certain (and older) dam in the Northwest, an engineer suggested that we visit the St. Francis damsite in lower California. This structure failed in 1928 and took 385 lives. So we returned to California, looked at the remnants and spent almost another day looking up the old published data relating to this calamity. In the older written reports, liberal coats of white-wash can now be readily discerned relating to the cause of the disaster. Maybe we are now taking a part in that controversy that raged over 20 years ago and are digging up ghosts that had best be left buried. However the disaster may have not been in vain if the designers of similar structures will profit by the simple lesson it offers:

St. Francis dam at the time it failed was full of water. It was a concrete structure and, compared to modern Goliaths, was small, being only 180-ft. high. The dam failed because of *over-confidence*. The builders felt they knew all the answers. They did not even bother to put in inspection galleries in the structure, and selected a foundation material that a freshman in college would look at with skepticism. They selected an aggregate that resembled none that this traveller had ever seen go into an important structure in some 30 years of travel.

Regardless of whether the concrete in the dam was good or bad, it obviously was not good enough. And if the impression persists that it was good concrete, then no one need worry in the future as to quality and character of an aggregate, or worry about gradation because this concrete shows no attempts at aggregate gradation, and in one chunk (about as big as a piano) we counted six kinds of rocks from micaceous schists to quartz and angular laminated sedimentary rocks, any of which, by present standards would be strictly taboo. The answer spelled the loss of 385 lives.

While at the dam remnants, we gathered up quite a few specimens of the concrete and by the time this is in print some of these specimens will be in the mails, going out to some of the men who have an important part in the construction of the nation's great dams. We hope they will keep the specimens handy when they are experimenting with the concrete in dams—those million dollar experiments—that call for adding every type and kind of a replacement for portland cement when there is no replacement for good portland cement.

N.C.S.A. to Convene February 4-7

THE 34TH ANNUAL CONVENTION of the National Crushed Stone Association will be held at the Netherland Plaza hotel in Cincinnati, Ohio, February 4-7. Agricultural Limestone Institute will hold its 6th annual convention concurrently with N.C.S.A., running from February 7-9. The Wednesday session, February 7, will be a joint meeting of the two associations. There will be no exhibit this year, but a full program of meetings and entertainment has been arranged.

Registration will begin Sunday, February 4, and will continue every day of the convention from 8:30 to 5:30.

February 5

J. Reid Callanan, president of National Crushed Stone Association, and president of Callanan Road Improvement Co., South Bethlehem, N. Y., will preside at the opening session. Following his greeting, Mr. Callanan will present a summary of reports on business conditions during 1950 and the outlook for 1951 as reported by the regional vice-presidents. Reports by the association engineering director, field engineer and administrative director will conclude the morning session.

The greeting luncheon on the convention's first day will present a national figure as speaker Rear Admiral Ellis M. Zacharias, USN (Retired), whose talk will be entitled "Today's World — Tomorrow's Peace." G. A. Austin, president, Consolidated Quarries Corp., Decatur, Ga., will preside at the luncheon.

The afternoon session will bring talks on "Quarry Lubrication" and "Use and Abuse of Conveyor Belts." A round table discussion on preventive maintenance will include among others the following topics: wire rope, winter repairs, salvaging and rebuilding wornout parts, maintenance of electrical equipment, and pneumatic tires.

In the evening there will be a cocktail party followed by a buffet dinner. February 6

A motion picture will begin the day: "Latest Developments in Machinery for Macadam Base Construction" presented by Macadam Pavements, Inc. Committees will then report, including the auditing, resolutions, membership and accident prevention committees. Addresses at this session will include "The Importance of Highways to National Defense" by Lt. Gen. Eugene Reybold, executive vice-president of American Road Builders' Association, and "The Design of Pavements for the New Jersey Turnpike" by O. J. Porter, consulting engineer, Newark, N. J.

Addresses to be given in the afternoon will include "The Practical Use of the Corps of Engineers Tests on Bituminous Concrete" by a representative of the Corps of Engineers, Waterways Experiment Station, Vicks-

burg, Miss.; "Manpower Problems as Related to Selective Service" by J. D. Griffing, chief, Manpower Division, National Selective Service Headquarters, Washington, D. C. Final address will be a report by J. C. Gall of Gall and Lane, Washington, D. C.

The Manufacturers Division will hold its annual business meeting and luncheon at 12:30 on this day. February 7

This will be the joint session of N.C.S.A. and A.L.I. for operating men and equipment manufacturers. A panel discussion on operating problems will bring forth such topics as jaw vs. gyratory crushers in primary crushing; surge piles vs. close coupled plants; single surface vs. multiple deck screens, and drop ball vs. drilling in secondary blasting. The joint luncheon will also be held, at which time an address will be presented by Col. Harold G. Hoffman, former governor of the state of New Jersey. Safety awards will also be presented at this time. In the afternoon, a talk "Shop Talk on Employee Relationships" will be given by H. S. Hall, vice-president of Bigelow-Sanford Carpet Co., New York, N. Y.

The joint reception and banquet in the evening will conclude the N.C.S.A. convention. A humorous address will be given at the banquet by James E. Gheen, New York City.

February 8

P. E. Heim, president, Agricultural Limestone Institute, will preside over the first session of the association. Reports of the managing director and secretary-treasurer will be given at this meeting. Dr. Firman E. Bear, chairman, Soils Department, Rutgers University, New Brunswick, N. J., will conclude the session with a talk on "Soils, Plants, Animals and Men Need Lime."

"Procedure for Furnishing Conservation Materials for 1951" will be explained by Roland Crumpler, chief, Conservation Materials and Services Section, Production and Marketing Administration, Washington, D. C. The meeting will also have a symposium on limestone spreading.

February 9

Addresses will include "The Rebirth of the Good Earth" by P. E. Grubb, DeKalb Agricultural Association, Inc., Johnstown, Ohio; "The Place of Lime in Farm Economy" by Dr. J. B. Hester, soil technologist, Campbell Soup Co., Riverton, N. J., and "Limestone, Agriculture and Grassland Farming" by R. W. Stout, soil editor, *The Kentucky Farmer*.

The annual business meeting will conclude the morning session. Reports of the auditing, resolutions and nominating committee will be given, and officers and members of the Board of Directors will be elected. That will end the convention, with the exception of a meeting of the newly elected Board of Directors in the afternoon.

\$10,000 SAVED ANNUALLY

on a \$12,600 investment

\$3,500 SAVED ANNUALLY

on a \$4,200 investment

These are actual Case Histories

CASE HISTORY No. 1

With a New Bulldog Hammermill crushing 20" and under Fuller's Earth, 50% moisture

Before

Operation required one primary double roll, 8 screens, two secondary double rolls, with auxiliary equipment.

Continuous clogging produced irregular finished product, consumed excessive fuel in drying, extruding operations expensive.

After

Installing one Bulldog Hammermill. One stage operation, no clogging — no delays or shut-downs.

Now produces a uniform cubicle product easily dried, saving fuel.

Saves labor, maintenance, fuel and produces a better finished product.

Second Hammermill purchased as a result of savings.

CASE HISTORY No. 2

Rebuilding an existing operating Hammermill crushing Limestone for cement

Before

Maintenance required replacement of 26,400 lbs. of manganese steel hammers and 12 sets of hammer bolts annually.

Load capacity required extra operating hours. Primary grinding was not suitable for final roll type pulverizer.

After

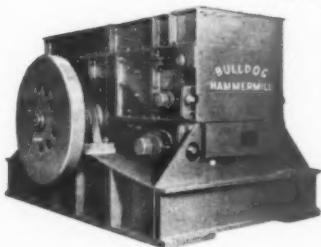
With Bulldog rebuilding, the Hammer replacement was reduced to 3,600 lbs. manganese steel and one set of hammer bolts per year.

Capacity increased 30% with less power consumption, better finished product saving power and maintenance in roll type pulverizer.

YOU CAN CUT COSTS — INCREASE CAPACITY — IMPROVE PRODUCT

with a

NEW BULLDOG HAMMERMILL



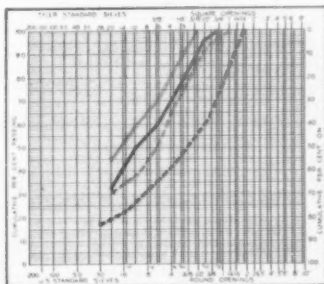
Compare your crushing operation with the actual proven results charted at right.

Solid red line indicates material from Bulldog Hammermill with screens in closed circuit.

Dotted red line shows Bulldog Hammermill no screens, open crushing.

Solid black line indicates standard impactor with screens in closed circuit.

Dotted black line indicates standard hammermill no screens, open crushing.



Bulldog Hammermills with Non Clog Moving Breaker Plate for sticky or high moisture materials or with Stationary Breaker Plate for dry materials are built in all sizes up to 72" x 60" for primary, secondary and fine reduction. Write for complete details.

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Cement Summary

(Continued from page 93)

indeed a big relief to know that our material handling situation and all the difficulties that went with it are now resolved."

Ideal Cement Co. plans to spend \$6,000,000 next year to expand its capacity and improve its plants.

The company says: "In spite of our increased production, there are certain areas which in our opinion are still not receiving enough cement to take care of requirements. Therefore, a decision has been made to install a new cement producing unit at Baton Rouge, La., where heretofore no cement has been manufactured. The company acquired the site for the plant in June, 1950, and is currently at work re-arranging certain equipment already in place and adding to that other equipment which upon com-

pletion will provide an additional 1,500,000 barrels of cement for the area.

"In addition, the program for 1951 includes new finish grinding machinery at Ada, Okla.; Superior, Neb.; and Trident, Mont., as well as improved facilities for handling raw materials at Mobile, Ala., and Boettcher, Colo.

"New wash and change houses for the convenience of employees will be built at Houston, Texas; Okay, Ark.; Portland, Colo.; Superior, Neb.; Devils Slide, Utah; and Trident, Mont. Other miscellaneous and plant improvement work brings the total for the year to something over \$6,000,000, although because of the uncertain military situation, there is some question as to how much of this program can be fully undertaken. Present plans provide for sufficient flexibility so that only such work as

can be undertaken with reasonable expectation of our ability to complete it would be incorporated in the program."

Calaveras Cement Co., San Francisco, Calif.: "A year ago, we announced completion of a \$2,500,000 postwar expansion program which doubled the output of our plant to 7,500 barrels of cement per day. This expansion included installation of a third kiln, 360 ft. long and 11 ft. 3 in. in diameter, additional raw and finish mills, a new electrical precipitator and other equipment, from one end of the plant to the other.

"On top of this program, we have started this year to build four additional cement silos which will remove an existing bottleneck by adding 60,000 barrels to our finished cement storage facilities. Also, we have purchased five new bulk-carrier trucks and trailers, thus enlarging our delivery fleet to 21 units, the largest company-owned transport service of any cement company in Northern California.

"For the year 1951, we contemplate still further important increases in our plant capacity. We have ordered a new 9- x 9-ft. preliminator ball mill and a new 9- x 24-ft. tube mill and, in the near future, will take bids for erection of four new slurry silos. We plan to replace two of our existing raw mills with these larger units and to move the old raw mills to the finish end."

Peerless Cement Corp., Detroit, Mich.: "We have had rather an extensive construction program in the planning for the years, 1950, 51, 52, 53 and 54, and only a portion of this work has been completed and the remainder of the work is being done according to plans.

"At our Detroit mill, we installed and started in operation, in August, two Bradley Hercules mills for preliminary grinding of clinker. These units have been operating very satisfactorily and have materially increased our finish grind capacity. We also plan to build a new concrete stack and install dust arrestor equipment of the most modern type early in 1951.

"At our Port Huron Plant, we have in the process of erection at this time, one 11- x 400-ft. kiln with unit firing coal mill, Fuller cooler, and all necessary dust arrestor equipment. This unit should be ready for operation early in '51. However, we will not have the necessary raw grinding equipment to enable us to operate two kilns to full capacity for much of the time in 1951. We also built a new concrete stack at this plant.

"As to the increased production of our plants, we hope to have a small increase next year, about the same as we have enjoyed in the past year."

Lehigh Portland Cement Co., Allentown, Penn., has increased its overall capacity very considerably since World War II, most of it being done in

VALUE OF NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS IN CONTINENTAL UNITED STATES

Type of Construction	(Millions of dollars)		Outlook 1951	Percent change outlook 1951 from revised Forecast 1950
	Official Forecast 1950 (July 1)	Revised Forecast 1950 (Oct. 25)		
Total new construction	25,850	27,270	22,580	-17.5
Private total	19,000	20,490	15,020	-26.7
Residential total	11,000	12,345	6,670	-46.0
New dwelling units	10,000	11,275	5,600	-50.3
Additions and alterations	850	900	0	0
Nonhousekeeping	165	170	170	0
Nonresidential building (nonfarm)	3,585	3,755	3,600	-4.1
Industrial	1,000	1,065	1,250	+17.4
Commercial	1,185	1,275	1,250	-2.0
Warehouses, office and loft bldgs.	340	400	500	+25.0
Stores, restaurants and garages	845	875	750	-14.3
Other nonresidential building	1,400	1,415	1,100	-22.3
Religious	385	400	300	-25.0
Educational	295	295	325	+10.2
Social and recreational	240	240	75	-68.8
Hospital and institutional	345	345	300	-13.0
Miscellaneous	135	135	100	-25.9
Farm construction	1,090	1,090	1,250	+14.7
Operator's dwellings	530	530	550	+3.8
Service buildings	560	560	700	+25.0
Public utilities	3,185	3,185	3,400	+6.8
Railroads	310	310	300	-3.2
Telephone and telegraph	475	475	450	-5.3
Other public utilities	2,400	2,400	2,650	+10.4
Local transit	40	40	40	0
Pipelines	155	155	175	+12.9
Electric light and power	1,355	1,355	1,485	+9.6
Gas	850	850	950	+11.8
All other private	140	115	100	-13.0
Public construction	6,550	6,880	7,560	+9.9
Residential building	490	335	490	+19.4
Nonresidential building	2,220	2,255	2,520	+11.8
Industrial	200	200	350	+75.0
Educational	1,050	1,125	1,300	+15.6
Hospital and institutional	325	455	445	-2.2
Other nonresidential	445	475	425	-10.5
Social and recreational	135	145	65	-55.2
Public administration	155	160	175	+9.4
Miscellaneous	155	170	185	+8.8
Military and naval facilities	135	150	370	+233.3
Highways, streets and roads	2,200	2,350	2,500	+6.4
Sewage disposal and water supply	630	655	625	-4.6
Publicly-owned utilities	185	175	150	-14.3
Conservation and development	975	860	775	-9.3
Bureau of Reclamation	300	260	225	-13.5
Army Engineers	575	500	450	-10.0
Tennessee Valley Authority	40	40	30	-25.0
Other	60	60	50	-16.7
All other public construction	105	100	90	-10.0

PRIVATE NON-RESIDENTIAL BUILDING ACTIVITY

Type of Construction	(Millions of dollars)		Total	1951	
	From 1940 Starts	From 1950 Starts		From 1950 Starts	From 1951 Starts
Total	1,065	275	790	1,250	590
Industrial	400	135	265	500	210
Warehouses, Office and loft buildings	875	135	740	750	165
Stores, restaurants and garages	400	165	235	300	200
Religious	290	140	150	325	180
Educational	240	90	150	75	55
Social and recreational	345	190	155	300	210
Hospital and institutional	135	25	110	100	40
Miscellaneous	3,725	1,155	2,600	3,600	1,650

(Continued on page 132)

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C. E. Ireland of Birmingham Slag Co. (left) with Fred E. Swineford, of Mecedam Pavements, Inc., relaxing between sessions



E. L. Flad, Carnegie-Illinois Steel Corp., president, National Slag Association



H. N. Snyder of The Buffalo Slag Co., left, with W. E. Bliss, Standard Slag Co.



H. N. Snyder, left, hears managing director E. W. Bauman explain how trophy was made, displaying piece of slag from first U. S. slag operation

SLAG PRODUCERS DISCUSS RESEARCH AND WAR DEVELOPMENTS

RESearch, AND DEVELOPMENTS in Washington, D. C., with respect to the defense program and its effects on industry were the principal topics of discussion at the thirty-third annual meeting of the National Slag Association, held November 29 and 30 in Washington. The program was well-rounded and provided two sessions for consideration of business matters.

President E. L. Flad, in his welcoming address calling the meeting to order, commented briefly on the prosperous condition of the industry. He expressed his appreciation to managing director E. W. Bauman for the efficiency with which association affairs were being conducted in the interests of the industry, and was happy to report that the association is in sound financial condition.

Mr. Flad was also pleased with the progress being made in research and promotion and gave his thanks not only to the association for its accomplishments but to the individual companies which have contributed their experiences and time to furtherance of research and promotion. Harris N. Snyder of The Buffalo Slag Co., Buffalo, N. Y., was extended thanks again for his part in making the Buffalo, N. Y., meeting (August, 1950) a tremendous success. Mr. Snyder and his company were hosts to the group at that meeting.

In commenting on progress of the slag industry, Mr. Flad touched upon new uses of slag that have been made in 1950 and on the trends in specifications that are now giving greater recognition of slag. He was particularly pleased that more uses are being found for water-granulated slag.

Managing Director's Report

Managing director E. W. Bauman, in his annual report for the year 1950, covered briefly the problems confronting the slag industry and gave an account of the principal current activities of the association and its staff.

At the present time the National Slag Association has the highest membership in its history, with 25 active member companies enrolled, one contributing member and an associate member. The majority of slag processors in the United States are members of the association but, as Mr. Bauman pointed out, non-members are being benefited by the association's service to the industry and it is desirable to increase membership. The association, according to Mr. Bauman, is in a very strong financial position and, as a result, has been able to operate during the past few years with an increased budget and

without increasing the overall annual dues.

Mr. Bauman reviewed briefly his travels in the field and said that his plans provide for visiting each member company at least once during 1951 to discuss problems. He served as general chairman of the arrangements committee for the Fall regional meeting of the American Concrete Institute in Washington and as a result, the association gained from a good job in public relations accomplished.

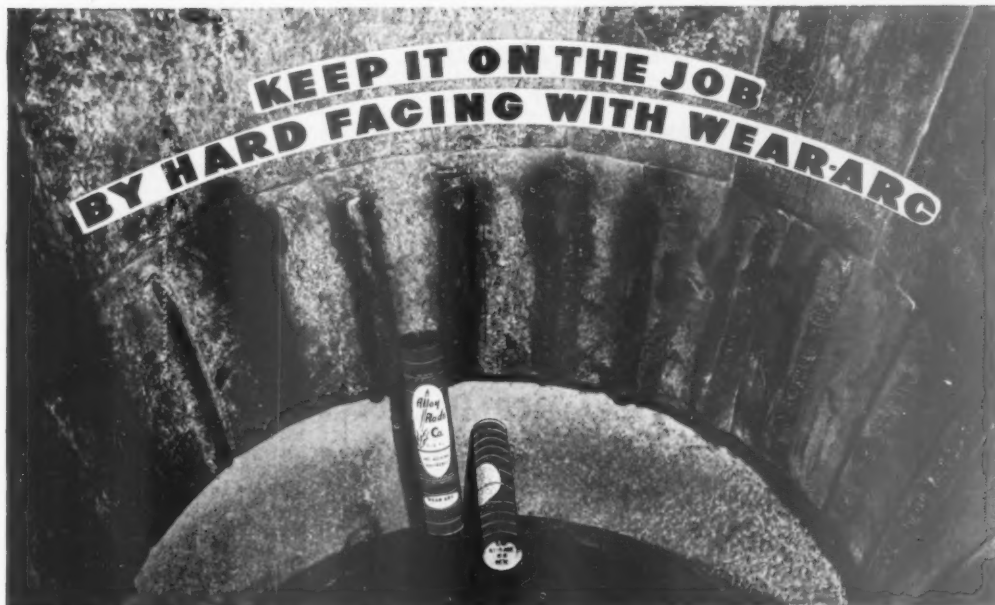
Association publications were discussed. During 1950 the *Slag Runner* was improved by carrying a printed supplement in each issue which I consider an outstanding "Job of the Month" or other material of interest to slag processors. Reprints are being run so that member companies can make use of them through distribution to slag users. An estimate of the cost to continue this service throughout the year was given and the opinion of the membership was that the publication was of excellent quality and should be continued. Mr. Bauman has requested that member companies prepare good articles for publication.

Because of a need for published material outlining the properties of slag, a rough draft of "Properties of Slag Concrete Masonry Units" has been prepared; and early completion of the pamphlet, after review by the problems committee, is scheduled.

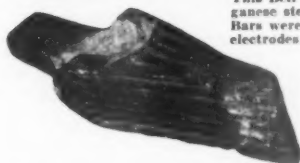
Mr. Bauman distributed an exchange of correspondence between his office and an official of the Bureau of the Budget which resulted in blast furnace slag being given status as a non-metallic mineral in the Standard Commodity Classification. This is the first time that blast furnace slag has been assigned a definite status, which will be of value in future relations with various government agencies where problems of the industry are involved.

In commenting on the Washington picture, the Defense Production Act of 1950 was discussed, as were the first steps of the president in establishing agencies to exercise powers granted under the Act. The Department of Commerce, through its National Production Authority, will be the agency with which the slag industry will have its contacts. Mr. Bauman believes, however, that the slag industry will be grouped with the mining industries and that the Bureau of Mines will again administer priorities to the industry when controls go into effect.

Some of the projects on which Mr. Bauman is now active are in determination of the position of the slag industry as to essentiality (Commerce



This Bell Crusher Concave was completely salvaged by welding, in vertical position, 1" round manganese steel bars to the worn manganese steel casting. The bars help hold and crush hard stone. Bars were welded with 5/32" WEAR-ARC WH electrodes and hardfaced with 3/16" WEAR-ARC 12 electrodes to provide an extremely hard wearing surface against impact and abrasion.



Bucket tooth life can be increased many times by welding manganese steel wedge bars to the worn tooth point with 3/16" WEAR-ARC WH electrodes, and by hard facing the entire surface of the tooth with 3/16" WEAR-ARC 12 electrodes.

WEAR-ARC Will Last Longer Against Abrasion and Impact

To reclaim worn equipment and protect parts against excessive wear, you will find one, or a combination of two, of the seven basic WEAR-ARC hard facing electrodes does the best job ... increases life as much as four times or more.

WEAR-ARC WH is ideal for build up and high strength welds on manganese steel; WEAR-ARC 12 for providing that hard wearing surface. Ask for bulletin No. 10550, illustrating and describing properties and welding procedures for the complete line of Wear-Arc hard facing alloys.

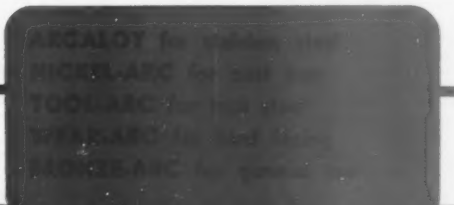


Ninety-five pound impact hammers of manganese steel are built up with WEAR-ARC WH and hard faced with WEAR-ARC 12. Life of new hammers can be increased many times by hard facing with WEAR-ARC 12 electrodes.



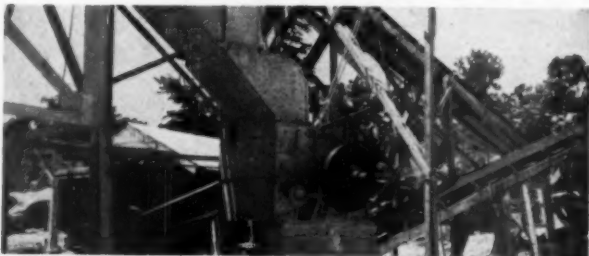
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AG STONE CRUSHING UNIT AT WORK FOR McCOLLUM ROCK PRODUCTS CO., SPRINGFIELD, MO.

Conventional Type 4XC designed for 40 to 45 tons per Hour on Ag stone and from 65 to 70 tons per Hour on Road Rock Aggregates.

GRUENDLER Large size Hammermills Built for Plant Operators producing 300 tons per Hour and more.

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Nothing else moves earth quite like a Sauerman Scraper or Cableway Excavator. It saves you dollars and headaches on long range material handling jobs with its simple operation—low fuel requirements—small maintenance charges—flexibility—sturdiness and dependability.

Tough ground conditions don't stop a Sauerman Machine. It will dig and haul anywhere—on a hillside, in muck, deep under water. Controlled by one easily trained man. Gasoline, electric or Diesel power. There's a wide range of sizes and models to meet every requirement.

Illustrations of typical uses, complete specifications, engineering data, are given in the Sauerman Catalog. Write for it now.



Sauerman Stockline Cableway of 1 cu. yd. size pictured above, digs gravel from under water and delivers to screens on top of bins. One man's labor and a moderate expenditure of power moves 65 cu. yd. an hour.



h.e.e is a small Sauerman Power Drag Scraper delivering gravel to a hopper that feeds to a crusher. The scraper, controlled by one man from a central operating station, swings in a wide arc to dig a large, deep pit.

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Department), the listing of slag operations as essential occupations (Labor Department) and representation of the aggregates industry on the Mineral Resources Council.

A preliminary listing of the steel requirements for the slag industry has already been submitted to the U. S. Bureau of Mines based on a quick estimate. Mr. Bauman's estimates were reviewed by the members and there will be revision after the members submit definite data before final submission to the Bureau of Mines.

In conclusion, Mr. Bauman expressed his appreciation to president Flad and all the officers for their help and cooperation in establishing a successful year for the association.

Research

Fred Hubbard, director of research, who had given a comprehensive report on research at the Buffalo meeting, confined his remarks to the need for consideration through research of problems and questions as raised by users of slag.

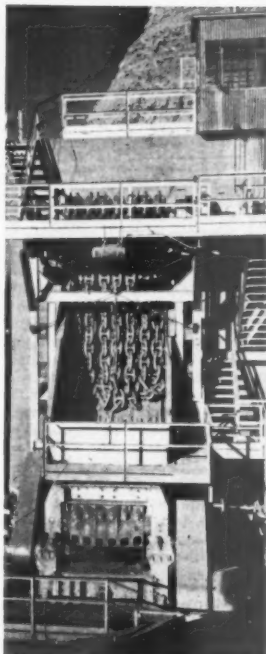
One of the problems on which there is inadequate information has to do with the general characteristics of plastic concrete made from expanded slag aggregate. Among the characteristics mentioned were factors essential to adequate structural strength, adequate durability, high heat insulating values, high sound-absorbing values, low thermal coefficient of expansion, low volume change and adequate resistance to high temperatures and fire.

Mr. Hubbard suggested that a comprehensive research project having as its objective a complete study of plastic concrete made from expanded slag as both fine and coarse aggregate should develop much needed practical information. Much of the work, he said, could be accomplished in the association's laboratory.

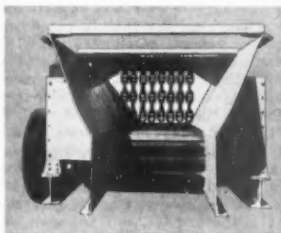
In commenting on tests of concrete made from screened granulated slag, he said that results thus far are encouraging with respect to workability of plastic concrete, air content, weight per cubic foot, ease of placing and finishing. It is his opinion that many uses for granulated slag, which is now being wasted in many steel-producing areas, could be developed by a well-planned research program.

Among other questions raised by users are three with respect to blending slag with other types of aggregates, said Mr. Hubbard. One question concerns the blending of slag and gravel as coarse aggregate for portland cement concrete, a second concerns the blending of slag and crushed stone as coarse aggregate and the third with the blending of slag sand and natural sand for concrete. Information on this entire subject is needed, he emphasized, and can be obtained through a modest research program. He said that air entrainment in concrete undoubtedly would greatly improve the workability of a slag-sand mixture.

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Another subject suggested as a project for field and laboratory research would develop information relative to the use of granulated slag as base or subbase courses of pavements. The effects on the pavements would be studied in particular.

Mr. Hubbard then turned to other matters not concerned with research. He emphasized the need for policing the products of the industry not only before shipment but, as far as is practical, as they are used on the job in order to contribute to best results. He mentioned complaints because slag on occasion has been shipped in dirty cars. He told of a serious case due to contamination with burned dolomite.

Another subject brought out had to do with measures to prevent popouts in slag concrete. Mr. Hubbard earlier had covered the subject in a special report, which some members had sent to plant superintendents with instructions to put the recommendations in force wherever slag is suspected of being contaminated with burned flux-stone.

Following his formal report, Mr. Hubbard discussed tests being conducted on agricultural slag at three universities. Results have indicated that slag is an excellent liming material and it appears that granulated slag has better characteristics than air-cooled slag.

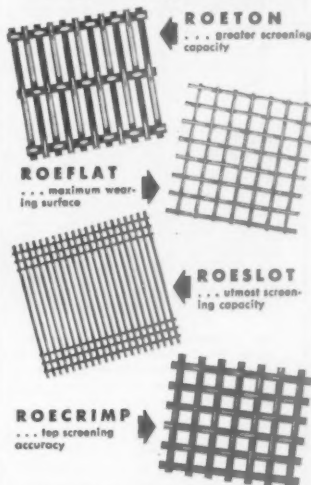
The balance of the program consisted of committee meetings and reports of the committee chairmen. Reports were submitted by R. K. Plumb for the advertising and publicity committee; W. E. Bliss for the budget and finance committee; A. W. Wood for the resolutions committee; H. N. Snyder for the nominating committee; and Charles Ireland for the membership committee. The complete slate of officers was re-elected.

Social Functions

The meeting started with a pre-convention gathering in president Flad's suite, the night before the convention. A feature of one of the luncheons was a showing of a Kodachrome movie on macadam construction by Fred. E. Swineford, engineer-director of Ohio Macadam Pavements, Inc. The movie was a very excellent and educational presentation, showing the latest in equipment application and handling in the laying of many classes of roads.

C. A. Baranowski, vice-president of the association, presided at the annual banquet which was preceded by cocktails and a reception for the guests. Each past president, the officers and guests were presented, as a souvenir, a piece of slag mounted on attractively finished wood. Mr. Bauman had secured a large piece of slag from the first furnace in the United States, at Saugus, Mass. (1643) and had the small pieces mounted, and an appropriate name plate carrying the name of the owner and the identification and date. It was an appropriate gift and was appreciated by all the recipients.

For maximum saving... THE RIGHT CONSTRUCTION IN THE RIGHT METAL



• ALL FOUR of the above Roebling screen constructions can be supplied in Roebling Stainless, Abraso, Roetemp, Monel or other metals. Thus you can combine the most efficient construction for your operations with the metal that will give longest life to your screens. And what's more, both Roetoslot and Roeton can be had in Roeflat construction which has 75% more metal wearing surface—extreme wear resistance—longer life. For smaller sizes in square mesh, Roecrimp meets exacting requirements for openings from $\frac{1}{8}$ " to $\frac{1}{16}$ ". Send coupon for full information.

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A CENTURY OF CONFIDENCE

1,100 Tons a Day

with Deister Screens at Kerford Quarries

Kerford Quarries began operation in 1886 at Atchison, Kansas, opened up a second operation at Amazonia, Missouri, in 1948. In both of these high-producing quarries, Kerford has standardized on Deister Machine Company Vibrating Screens . . . employs Deister exclusively for accurate sizing, trouble-free performance, top production.



Raw crushings are fed to this twin set of 3-deck 5'x12' Deister Vibrating Screens. Plus 1½ inch material from top decks, plus 5/16-inch from middle decks are gravity-fed to another crusher.



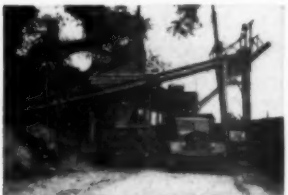
And for the final preparation of fine agricultural limestone, Kerford has installed one of Deister's new Ag-Lime Screens . . . the screen specifically designed for high-speed sizing of extreme fines without blinding.



This over-all view of the Amazonia plant shows how Deister Screens are employed for high-speed sizing . . . 1,100 tons a day . . . as stone moves from crusher to railroad cars.



Plus No. 8 mesh, received from the bottom decks of the twin screens, is fed to a third triple-deck Deister, this one a 4'x12'. Top deck is covered with a 1-inch cloth, middle deck with ½-inch, bottom deck with 5/16-in. Minus No. 8-mesh is dropped into bin for agstone.



At the home plant at Atchison, a triple-deck Deister vibrating screen accurately sizes 150 tons an hour . . . in fact, performed so well that it led to the purchase of three more triple-deck Deisters and the Ag-Lime Screen for the Amazonia plant.



DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

Labor Relations Trends

(Continued from page 67)

employees, or 80 per centum or more of all employees who are eligible to benefit under the plan if 70 per centum or more of all employees are eligible to benefit under the plan, excluding in each case employees who have been employed not more than a minimum period prescribed by the plan, not exceeding five years, employees whose customary employment is for not more than twenty hours in any one week, and employees whose customary employment is for not more than five months in any calendar year."

The National Gypsum Co., Buffalo, N. Y., adopted such a plan, effective July 1, 1950. It provides for hourly-paid employees only. It provides for a minimum monthly pension of \$100 including Social Security (not including the wife's or dependent's pension) for a service record of 25 years, and proportionate pensions for services of 15 years or more, at retirement age of 65 years. This plan has no specified life. By its terms the company "reserves the right at any time or times, by action of the Board of Directors, to modify, amend or terminate the plan in whole or in part by delivering to the Retirement Committee a certified copy of the resolution," etc. However, no portion of the trust fund can revert to the company; this is a standard provision and necessary to comply with the plain wording of the Treasury code.

Administration of Plan

In the case of company initiated plans, such as those of the Warner Co. and the National Gypsum Co., the administration of the plan, outside of the duties of the investment trust, is in the hands of a committee appointed by the Board of Directors of the company. Where the pension plan is in the form of a contract or agreement with a single union, as in the case of the Ideal Cement Co., there is an advisory committee consisting of four members, two appointed by the company and two by the local union. These serve in an advisory capacity only, however, for Sec. 1, Article V of the agreement states unequivocally: "The company shall be responsible for the general administration of the plan and for carrying out the provisions thereof." Evidently this means that the company can be held responsible for the pensions even though the trust fund should fail, since elsewhere it is provided that the company executes the trust agreement and selects the trustees. Other plans, as in the case of the Warner Co., are careful to make the trustee, not the company, liable for all obligations under the plan.

Since the Ideal Cement Co. plan is the first we have seen providing for more or less joint supervision by company and union, the following quotation regarding this advisory committee of four is interesting:

"The company members shall vote as a unit, and the Union members shall vote as a unit.

"(b) The Advisory Committee shall meet at such times and for the transaction of necessary business as may be mutually agreed upon by its members.

"(c) The duties of the Advisory Committee shall be advisory only and shall consist of the following functions solely as they relate to the Plan:

"(i) Carry out rules and procedures set forth in this plan to be followed by employees in filling applications for benefits and for furnishing and verifying proofs necessary to establish their age and credited service in accordance with rules of eligibility for benefits under this plan.

"(ii) To find facts and determine the rights of any employee applying for retirement benefits and to afford any applicant or the company, if dissatisfied with any finding of fact or determination, the right to a hearing.

"(iii) To apply the procedure set forth in the Plan for establishing and verifying credited service of employees and, after affording employees and the company an opportunity to object, to determine the credited service of employees at or before retirement.

"(iv) The advisory committee will formally advise the company of each employee when retired and furnish such data as is necessary for the company to cause payment of benefits to the employee in accordance with the plan.

"(v) To prepare and distribute information explaining the provisions of the plan, to furnish to the company and the union reports of the names and ages of retired employees to whom the committee recommends pensions to be paid, the amount of the pensions, and other facts as provided in this agreement.

"(d) In the event of a disagreement among the members of the Advisory Committee, the Director of the Federal Mediation and Conciliation Service shall be requested to act or appoint an arbitrator. The arbitrator shall meet with the Advisory Committee and present his written decision which shall be binding and final.

"(e) The compensation and expenses of the company members will be paid by the company and the compensation and expenses of the union members will be paid by the union, and no part of such compensation and expenses will be paid from the trust fund."

New BANTAM METHOD

Boosts output **20%**
saves **64** man-hours per day!



Bantam loads No. 1 truck with 90° swing... makes 270° reverse swing to load truck No. 2, while laborers are breaking clay in No. 1.

Theo. Langenberg & Son Mining Co., New Haven, Mo., cuts costs with Bantam

It used to take 12 men 8 hrs. to load 100 tons of blasted clay from stockpile to trucks, including time spent breaking clay by hand to 6" size, for making Diesboro cement. Now, only 4 men and a Schield Bantam shovel load and break 120 tons per 8-hr. day — 20% more production with 64 man-hours less labor. "What's more," says Langenberg, "if the clay didn't have to be brok-

en, our Bantam could easily handle 360 tons per day."

Mobility Pays Off!

To save transportation costs, Langenberg drove his truck-mounted Bantam 360 miles from factory to New Haven in just 12 hrs. running time. This high speed mobility also enables Langenberg to keep his Bantam busy during slack periods — excavating foundations and working various roadside clay and gravel pits within 40-mile radius. You, too, can get more jobs done at less cost with a mobile Bantam.

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☐ Shovel (\$5900)*
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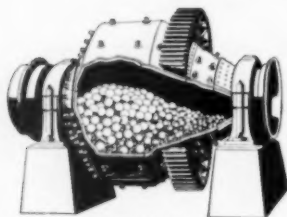


SCHIELD BANTAM

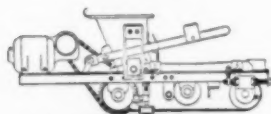
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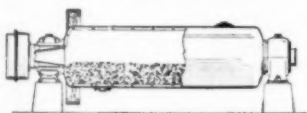
CONICAL MILLS
Bulletin 17-B-7



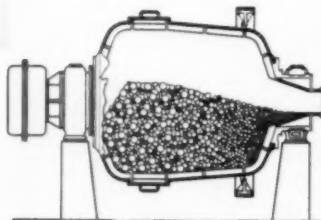
CONSTANT-WEIGHT FEEDERS
Bulletin 33-D-7



THICKENERS, CLARIFIERS, FILTERS
Bulletin 35-C-7



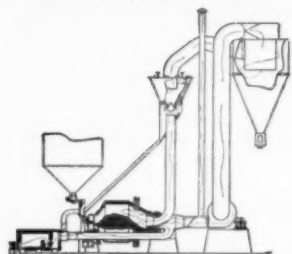
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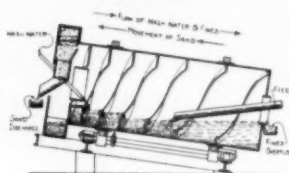
TRICONE MILLS
Bulletin AH-414-7



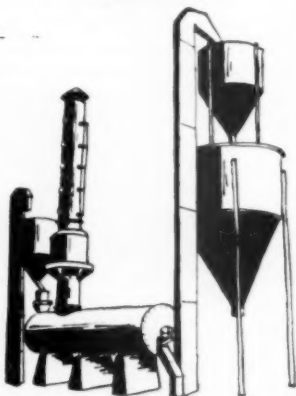
ROTARY DRYERS, KILNS, COOLERS
Bulletin 16-D-7



AIR CLASSIFYING SYSTEMS
Bulletin 17-B-7



COUNTER-CURRENT CLASSIFIERS
SAND WASHERS
Bulletin 39-B-7



LIME HYDRATORS
Bulletin 49-7

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Cement Summary

(Continued from page 144)

the course of rehabilitation at a number of the company's plants. The changes which have resulted in increased capacity are as follows:

"Birmingham, Ala. Additional facilities were installed for grinding clinker which increased the clinker grinding capacity of Type I cement by 225,000 barrels a year. However, most of this additional grinding capacity was consumed in the manufacture of mortar and high early strength cement.

"Fogelsville, Penn. Likewise, at our Fogelsville plant we increased the clinker grinding capacity of Type I cement by 360,000 barrels a year for the purpose of grinding additional amounts of Type III and mortar cement.

"Fordwick, Va. At this plant we have just completed a rehabilitation program and facilities for an increase in clinker capacity of 550,000 barrels of clinker a year. This included installation of a new kiln, coal pulverizers for all kilns, complete new storage facilities for raw materials, clinker and coal, and a complete new raw mill. The old raw mill was converted to clinker grinding, which added approximately 360,000 barrels of Type I clinker grinding capacity. This added capacity is used largely for grinding additional amounts of Type III and mortar cement.

"Mason City, Iowa. Here also a rehabilitation program is practically completed providing an increase of clinker capacity of about 660,000 barrels a year. The clinker grinding capacity was increased by over 1,000,000 barrels a year. The overall project included new facilities for storing and handling clinker, limestone, gypsum and coal, completely new raw grinding and clinker grinding equipment which is housed together in a new building. Also a new electric precipitator is about ready for use. It may be of interest to know that this project included the conversion from wet to dry process.

"Metaline Falls, Wash. The annual clinker producing capacity of this plant was increased by 660,000 barrels and the clinker grinding capacity was increased by approximately 700,000 barrels a year and we are now adding an additional tube mill to provide even more clinker grinding capacity.

"Union Bridge, Md. Changes consisting largely of the installation of new coolers, increased our clinker producing capacity at this plant by approximately 100,000 barrels a year.

"Oglesby, Ill. Additional preliminary clinker grinding equipment was installed which resulted in an increased capacity for the entire clinker mill for Type I cement, of 340,000 barrels a year.

"Covering all of these plants, we have increased the clinker producing capacity by approximately 2,000,000

barrels and the clinker grinding capacity by approximately 3,000,000 barrels a year.

"You understand that the excess of clinker grinding capacity over the clinker producing capacity often permits higher annual production because clinker can be stored during times when cement stock houses are filled, and then ground during the heavy shipping season. Also, if used for producing mortar cement, which requires less clinker per unit weight than the standard types of cement, a higher total production will result."

An eastern manufacturer: "During the year we completed a new chemical laboratory, of which we are quite proud. We also let contracts for a new kiln, 375 ft. long by 11 ft. diameter, the same having been placed with Allis-Chalmers Co. and the installation of same will take place during the winter. We hope to have it in operation by May 1. While it will add about 2500 barrels per day to our capacity, we do not expect to obtain that increase on an annual basis. We have increased our raw department to take care of it and have made some increase in our finish grinding, but not to the full limit of the kiln capacity. As near as we can foresee conditions, we think that we will operate on the basis of an increase of about 500,000 barrels per year. This long kiln, of course, produces economies, and that was one of the prime reasons for making the installation."

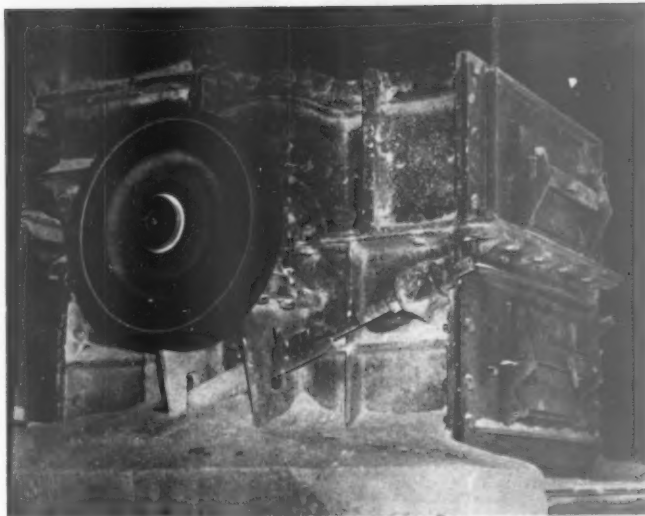
Another eastern manufacturer: "At one of our mills we installed a new kiln last summer, 314 feet long by 9 feet in diameter. This gives us a battery of three kilns of these dimensions, all modern. Two new 10,000 barrel silos have also been constructed in which the raw mix is aerated on its way to the kilns for burning. Old equipment throughout the plant is being replaced and modernized."

"At our other mill, work is going forward on a new kiln 11 feet in diameter by 356 feet long, which will give us two kilns of this identical size. The new kiln will replace the smaller of the two kilns now in operation and, like at our other plant, a program of modernization has been under way for some time."

"Overall, we estimate that when the work we have undertaken is finished we shall have increased our production of portland cement by approximately 20 percent or over 500,000 barrels a year."

A large California manufacturer: "We will be unable to give you the information you desire at this time, for reasons I will be glad to explain to you personally on your next trip out. This plant expansion program, which will definitely aid the serious cement shortage, can be revealed in detail within two or three months, and at that time, we will be happy to give you a full outline of our program."

A manufacturer in Pennsylvania: "During 1950, our cement plant improvement program provided for the



**1,150,000 TONS
OF STONE CRUSHED
WITH A PARTS-REPLACEMENT COST
OF ONLY**

**1/3¢ PER
TON**

AMERICAN ACS-4 HAMMERMILL at Missouri Quarry gives proof of BUILT-IN QUALITY

At a large Missouri Quarry, this rugged American Hammermill keeps parts-replacement — and stone crushing costs — down to a minimum.

That's because Americans are built to last — with heat treated alloy steel main rotor shaft . . . heavy-duty Timken Bearings enclosed in dust and oil-tight pillow blocks . . . heavily ribbed sectional frame for vibration-free operation and easy accessibility and adjustability . . . all-manganese steel crushing parts for longer wear.

From agstone to roadstone sizing, Americans offer the flexibility and consistent sizing control that make every reduction job more efficient as well as more profitable.

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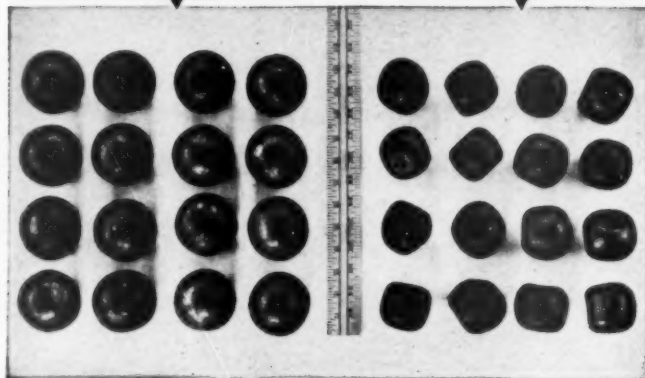
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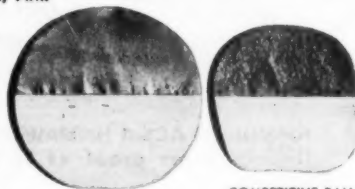
**COMPETITIVE
FORGED BALLS**



THERE IS A DIFFERENCE IN FORGED STEEL BALLS

Again, the longer wearing qualities of Sheffield Moly-Cop balls have been demonstrated. This time in a test grinding barite ore at Magnet Cove Barium Corp., Malvern, Ark.

An equal number of Moly-Cop and competitive forged steel balls were charged into the same mill at the same time and were recovered after 4604 operating hours. All were originally 3½ inch nominal diameter and marked for identification.



The recovered test balls are shown in the top photograph. Clearly evident is the difference in rate of wear. The competitive forged balls wore 38% faster, based on average diameter loss. Note also the pronounced difference in retention of spherical shape.

Typical fractures of the two types of test balls are shown in the lower photograph. Note the fine, hard, martensitic grain structure of the Moly-Cop ball.

The economy of Moly-Cop balls has been borne out in reports from all over the world. A comparative test in your own mills will demonstrate just how much more economical are Moly-Cop balls in your grinding operations.

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installation of three Bradley Hercules mills, together with suitable dust collectors, in the clinker grinding end of our cement manufacturing. Some other heavy repairs have been made, but at this time we do not contemplate any major improvements or expansion during the year 1951."

One of the large eastern manufacturers with multiple plants: "Except for the new kiln which was installed at one of our plants in 1948 to replace two worn-out kilns and which increased the capacity of that plant somewhat, our efforts have been directed toward making full use of our capacity."

Oregon Portland Cement Co.: "On approximately June 1, 1947, we started up a second unit at our Oswego, Oregon, plant that up to January 1, 1950, increased the production at this plant from approximately 400,000 barrels per year to slightly over 1,000,000 barrels per year."

"Commencing with January 1, 1950, the production at the Oswego plant was further increased by approximately 100,000 barrels by the addition of more suitable kiln burners."

"During 1950, at our Lime, Oregon, plant there was installed a hammermill operating in closed circuit with a screen to provide for increased slurry production. While the clinker production due to the increased slurry production has not been fully realized this year, it is estimated that very close to 100,000 barrels increase in production can be expected at this plant for the year 1951."

A western manufacturer: "We are adding another kiln and additional equipment and will within a few months bring our output to double the present amount. I think the situation in our territory is not too bad and could be a lot better if the products people would not be quite so anxious to take on new business all the time."

Canada Cement Co., Ltd., which has announced a new plant expansion program that will bring its increase in cement production to 60 percent since World War II, wrote:

"The following additions were included in the first phase of our post-war expansion program. These units have been in operation for some time."

"1) A new kiln at our Montreal East, Quebec, plant (the 6th now in operation)."

"2) A new kiln at our Belleville, Ontario, plant (which doubled the output)."

"3) A new kiln at our Exshaw, Alberta, plant (which doubled the output)."

"4) A number of modern installations at each plant to increase efficiency and production. These include, new bulk loading facilities, dust collectors, new crushing plants, new quarry equipment, laboratories, cafeterias, recreation buildings for plant employees, etc."

The foregoing quotations from let-

ters received are representative of but a small fraction of the enlargement and modernization in the cement industry since World War II and now in process. It may be said that all cement manufacturers, with the exception of a very few, have enlarged production to some degree either through major equipment installation or through improvement of existing facilities. Announcements of the various programs for rehabilitation and enlargement have been published in **ROCK PRODUCTS** and a number of completed programs have been fully considered. For the purpose of this summary, we review most of them herein.

There have been several entirely new mills built or they are in the process of construction but the important increases in productive capacity have come from existing plants that have been substantially enlarged. Among the new plants is the wet process operation of Halliburton Portland Cement Co., Corpus Christi, Texas, which made available 1,500,000 bbl. of additional capacity to the southwestern market. This plant is an oyster shell operation, with two 9-ft. 6-in. x 377-ft. rotary kilns (See **ROCK PRODUCTS**, August, 1950 pp. 116-135 for complete article).

Another new plant is the Arizona Portland Cement Co. (California Portland Cement Co.) operation at Rillito, 20 miles north of Tucson, Arizona. The plant is dry process and has a production of 2000 bbl. of clinker per day.

Lone Star Cement Corp. has made notable increases in capacity, affecting a number of mills, and has new plants under construction at Roanoke, Va., and at Sweetwater, Texas. Construction at Roanoke is well advanced (as already widely publicized) and work is now getting underway at Sweetwater to build a mill with two 10- x 340-ft. rotary kilns which will produce 4000 bbl. of clinker per day.

Carolina Giant Cement Co. increased the availability of cement in the southeast by an estimated 800,000 bbl. annually with completion of a single-kiln wet process plant.

Permanente Cement Co., Permanente, Calif., has a \$3,500,000 program in process which will increase manufacturing capacity by about 25 percent to an estimated 7 million barrels annually. This is the fourth major expansion program of the company in a period of ten years and it includes extension and enlargement of distribution facilities for servicing the northwest, Canada and Alaska.

Volunteer Portland Cement Co., Knoxville, Tenn., has completed a million dollar expansion program that increased capacity from 1,400,000 to 2 million barrels annually.

Monarch Cement Co., Humboldt, Kans., has had an extensive modernization program underway, consisting principally of the installation of two 11- x 230-ft. dry process kilns with waste heat boilers and auxiliary boilers. One unit is now in operation and

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the second is in process of installation. The Olympic Portland Cement Co., Ltd., Seattle, Wash., has installed an oil-fired kiln and generally modernized the mill at Bellingham for greater production.

Marquette Cement Manufacturing Co. has enlarged production at Des Moines, Iowa, and at other plant locations in addition to starting building a new plant at Brandon, Miss.

Louisville Cement Co., Louisville, Ky., installed a new clinker grinding department, 10- x 150-ft. rotary kiln and waste heat boilers several years ago to complete its modernization program.

General Portland Cement Co., Chicago, Ill., with cement plants at Hookers Point, Fla., Chattanooga, Tenn., Eagle Ford, Texas, Fort Worth, Texas, and Houston, Texas, in its annual report of December 7, 1950, to stockholders pointed out that its improvement and expansion program starting in 1946 had increased annual productive capacity of its plants from about 6,600,000 to 8,885,000 bbl. As this is written, the company has just announced that a third unit of its expansion program at Dallas (Eagle Ford) is to be undertaken at an estimated cost of \$450,000. Sales of the company have doubled, almost exactly, in comparing 1950 with 1946 figures.

Among other plant changes, **Pennsylvania-Dixie Cement Corp.** reportedly was to install a 12- x 500-ft. rotary kiln in one of its plants, which would be the largest rotary kiln in North America. The company acquired the West Penn Cement Co. with plant at West Winfield, Penn., early in 1949.

South Dakota State Cement Plant, Rapid City, S. D., has recently completed an expansion program, involving as a principal feature an 11- x 375-ft. rotary kiln which approximately doubles clinker capacity of the plant.

Huron Portland Cement Co., Detroit, Mich., which has the reputation as having the largest single cement mill in the world at Alpena, Mich., with capacity in excess of 7 million barrels of cement annually, has added six kilns since World War II and many other equipment units adding to capacity. Important additions have also been made to distribution facilities. A separate article in this issue tells of the 1950 program of expansion.

Despite the fact that the cement industry is highly cyclical, investment in new equipment continues to take place at a rapid rate and there is evidence that the abnormal civilian demand (as of 1950) for cement is no longer far in excess of available supply. In some sections of the country, like in southern California, plant capacity is now greater than 1950 requirements were. It should be emphasized that additions to plants have added the greatest capacity, by far, as contrasted to new mills, and have been emphasized by the industry because the cost per barrel, of added ca-

capacity, is substantially less than the unit cost for capacity added by building new mills.

Zoning

(Continued from page 121)

spreading lime from motor boats, the pH of the water was increased (alkalized) and the lake became crystal clear. Trout planted in these waters more than doubled their size it was reported.

It was further indicated that a lake treated with a small amount of lime would produce "pound for pound" more protein than adjacent pasture land.

Application of T-H Act to Sand and Gravel, Concrete Industries

THE APPLICATION of the Labor-Management Relations Act (Taft-Hartley Act) to the sand and gravel and ready-mixed concrete industries was recently clarified in a recent letter from Charles A. Horsky to Vincent P. Ahearn, executive secretary of the National Sand and Gravel Association. Mr. Horsky's analysis represents the best answer that can be now given as to whether the Board will take jurisdiction over dispute cases in which members of the two industries are involved.

As applied to these industries, the analysis states, the Board and the General Counsel will take jurisdiction of a matter under the Labor-Management Relations Act where:

(1) The company has operations in more than one state even though each particular operation is conducted as an intrastate business, or

(2) The company makes sales of its products outside the state in an amount exceeding \$25,000 a year, or

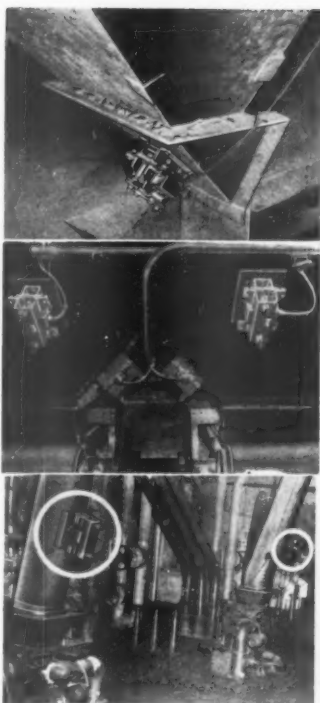
(3) The company makes annual sales in excess of \$50,000 a year to (a) companies directly engaged in interstate commerce such as railroads, telephone and telegraph companies, radio and television systems, or (b) public utility, street railway, or bus companies, or (c) companies which annually produce \$25,000 worth of goods destined for shipment out of the state, or

(4) The company (a) makes annual purchases from outside the state exceeding \$500,000, or (b) makes annual purchases from within the state of goods originating outside the state valued at \$1,000,000 or more, or (c) where the sum of the several respective percentage of purchases and/or sales of the type mentioned above equal or exceed 100 percent, or

(5) The company sells materials to national defense establishments.

To Open Limestone Quarry

THE STANDARD LIME AND STONE Co., Baltimore, Md., has announced plans for opening a limestone quarry near Bellefonte, Penn. The company is a large producer of crushed stone products and lime, and also manufactures portland cement.



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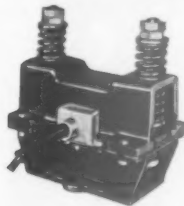
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Expands Crushed Stone Operations

NEW YORK COAL SALES CO., Columbus, Ohio, has expanded its facilities for producing construction materials of all kinds with the establishment of the Highland Stone Division near East Danville, southwest of Hillsboro, it was announced by E. H. Davis, president.

The new division results from the acquisition of the Scott Limestone Quarries in Highland County. Production at this operation alone is expected to run over 200,000 tons the first year. In addition to crushed stone for highway construction, the company will produce agricultural limestone and chemical stone for the steel and chemical industries.

Extensive new equipment will be installed at the Highland County operation soon. This will include a ready-mix concrete plant, an asphalt mixing plant and the latest types of washing and sizing machinery for the various grades of stone to meet state highway and industrial specifications.

G. K. Mitchell, Columbus, executive vice-president of New York Coal Sales Co., has named his assistant, Robert M. Patton, Columbus, as the active head of the new Highland Stone Division. He will remain in the home office of the parent company, 150 East Broad Street.

General manager of the Highland Stone Division in charge of operations will be Paul E. Ryan, Sinking Springs, who also is in charge of the company's Plum Run Stone and Basic Construction Materials Divisions. Sales Manager is Leo L. Davis of Chillicothe who also is in charge of Sales for the Plum Run Stone Division.

New York Coal Sales Co. also owns and operates the Hocking Valley Brick Co., at Logan and Nelsonville; New York Coal Co., Chauncey, Ohio; Basic Lumber Products Co., McArthur, Ohio; Southern Orchards Division, Jackson, Ohio; Southern Quarries and Contracting Division, Chillicothe; Superior Cement Division, Portsmouth; Plum Run Stone Division and Basic Construction Materials Division, Chillicothe and Circleville.

A.E.D. Annual Meeting

THE ASSOCIATED EQUIPMENT DISTRIBUTORS will hold its 32nd annual meeting January 28-February 1, at the Stevens Hotel, Chicago, Ill. P. D. Herman, executive secretary, predicted that attendance would equal the record-breaking total of 1700 distributor and manufacturer members who attended the 31st annual meeting. Advanced registrations had already passed the 1600 mark in late November. The 1951 program will feature several distributor forums, a joint distributor-manufacturer panel, addresses by outstanding speakers and many social activities.

Agricultural Liming Material

NATIONAL AGRICULTURAL LIMESTONE ASSOCIATION has issued the following report of the total use of agricultural liming material in the United States for 1948 and 1949, as assembled from various sources including the U. S. Department of Agriculture, state departments of agriculture, county agents and individual producers, listed by states:

State	Tonnage	
	1948	1949
Alabama	184,671	190,404
Arkansas	80,950	91,926
California	60,909	23,845
Connecticut	59,039	68,527
Delaware	32,925	46,266
Florida	92,090	157,619
Georgia	183,291	309,410
Illinois	4,892,344	4,763,326
Indiana	2,061,284	2,607,148
Iowa	2,981,525	3,386,455
Kansas	900,759	827,349
Kentucky	1,000,899	1,015,341
Louisiana	100,000	78,513
Maine	65,013	81,246
Maryland	290,000	224,391
Massachusetts	66,000	57,263
Michigan	782,863	745,692
Minnesota	308,281	413,220
Mississippi	156,068	129,615
Missouri	2,873,211	2,981,698
Montana	102	105
Nebraska	—	5,627
New Hampshire	29,548	34,297
New Jersey	185,921	183,424
New York	578,643	706,829
North Carolina	325,585	408,427
Ohio	2,113,022	2,216,511
Oklahoma	328,827	403,781
Oregon	101,235	86,479
Pennsylvania	1,064,894	1,321,402
Rhode Island	9,211	9,645
South Carolina	133,142	186,528
Tennessee	548,623	706,288
Texas	67,527	73,496
Vermont	66,526	94,422
Virginia	750,000	780,427
Washington	26,200	28,716
West Virginia	216,536	281,425
Wisconsin	2,000,000	2,108,627
Wyoming	—	4,273

Grand Total 25,686,416 27,991,969

The first five ranking states were the same in 1948 and 1949 in the following order: Illinois, Iowa, Missouri, Ohio and Indiana.

Plant Expansion

MONARCH CEMENT CO., Humboldt, Kan., has started the second phase of a rebuilding program started more than two years ago, according to a recent announcement by Walter H. Wulf, president of the company. Previous expenditures for the program totaled \$1,500,000. In November work was begun on the installation of an 11 x 230 ft. kiln. Other new equipment will include a 4½- x 70-ft. air-quenching clinker cooler, a direct-firing coal mill and a waste heat boiler. In addition to the cement manufacturing equipment, the company plans to install new dust arresting units. All work is expected to be completed by July, 1951.

Urges Capacity Operations

NATIONAL CONCRETE MASONRY ASSOCIATION, in a recent news bulletin to its members, urged every producer of concrete masonry units to plan now to operate through the winter at capacity so that an adequate stockpile of materials would be available to the construction industry when needed for spring construction.

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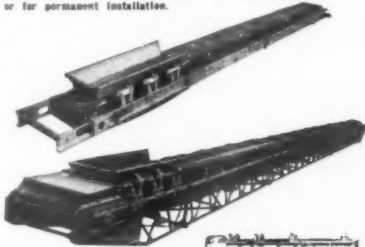
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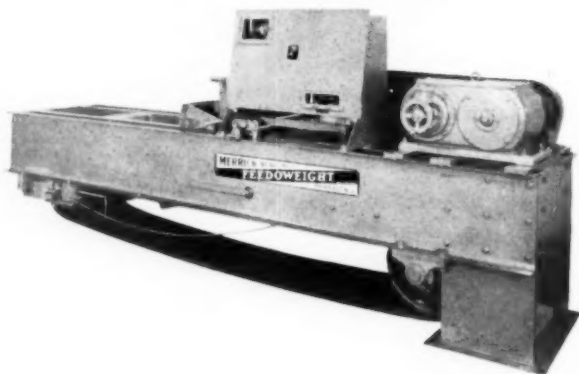
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Huron Expansion

(Continued from page 101)

the engineering that has accomplished the program of rehabilitation and enlargement discussed herein. We were particularly fortunate in having the opportunity to make a tour of inspection of the various plants in company with William W. Crapo in his car during November at a time when the various programs were nearing completion. Mr. Crapo is an accomplished photographer and personally took the majority of photographs used to illustrate this article.

Issued Patents

Huron Portland Cement Co., Detroit, Mich., has been granted patents covering air-activated gravity conveyors and accessories. The patents were issued October 24, 1950, and are:

2,527,455—an air-activated gravity conveyor having a conveying surface of flexible fabric.

2,527,488—an air-activated gravity conveyor having a conveying surface of low air permeability porous stone capable of handling hot materials.

2,527,466—An air-activated gravity conveyor having a conveying surface of flexible fabric formed as a loop in vertical cross section.

2,527,394—a side take-off valve for air-activated gravity conveyors.

2,517,837—issued August 8, 1950—a bottom take-off valve for air-activated gravity conveyors.

The Huron company has granted an exclusive license for all industrial uses to Fuller Co., Catasauqua, Penn. Fuller Co. is manufacturing under the trade name "F-H Airslide." Licenses have also been granted to Gramm Trailer Corp., Delphos, Ohio, and to The Trailmobile Co., Cincinnati, Ohio, for the use of these conveyors in motor vehicles for bulk material transportation.

Canadian Expansion

CANADA CEMENT CO., LTD., Montreal, Canada, has announced plans for a \$5,000,000 expansion program at its Exshaw plant in Alberta. The plant addition will include installation of a new kiln and other equipment. The project is expected to be completed by the end of 1951 and it was said that production would be increased by 62 percent. Present capacity is about 1,600,000 bbl. of cement annually at that plant.

Changes Address

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., has moved its Kansas City district sales office to 1221 Baltimore Ave., Kansas City 6, Mo.

New Vermiculite Association

THE VERMICULITE ASSOCIATION, Inc., a New York non-profit research organization, was recently formed by leading independent miners and processors of vermiculite to increase and diffuse knowledge and uses of vermiculite in various fields. An organization meeting was held in October at the Hotel Commodore, New York. N. Y. William S. Steele, president of American Vermiculite Corp., New York, N. Y., was elected chairman of the Board of Directors and Henri R. Bastien, president of Vermiculite Insulating, Ltd., Montreal, Canada, was elected vice-chairman. Other members elected to the board were Robert L. Wilkerson, Southern Mineralite Co., Inc., New Orleans, La.; Napoleon M. Bernier, California Stucco Products of N. E., Inc., Cambridge, Mass.; John A. Cawley, American Vermiculite Products Corp., Newark, N. J.; William C. Marshall, F. E. Schundler & Co., Inc., Long Island City, N. Y., and John W. Lewellen, Jr., Hyzer and Lewellen, Southampton, Penn. William S. Elliott, an authority in the field of structural materials, was named secretary-treasurer and engineering consultant of the association.

Association membership includes four categories: mines; processing plants; industrial users of vermiculite as an ingredient raw material in various products, and educational and research institutions as well as interested engineers and individuals.

Among the first projects of the association will be the setting up of standard specifications for both crude ore and expanded products; the inspection of plants; the evaluation of admixtures and binders; the approval of underwriters laboratories, government, state and municipal authorities and the publication of bulletins, data sheets and technical information.

Study of Conduit Deterioration

DR. HAROLD S. SWEET, assistant professor of civil engineering at the University of Wyoming, and two graduate students are making a study to determine why the use of sand and gravel in concrete from a few specific areas in Wyoming has led to early deterioration of the concrete. Factors to be explored include the chemical reactivity, the influence of physical characteristics such as porosity, and thermal expansion.

Dr. Sweet and his assistants are using accelerated weathering tests as a means to determination of lack of durability. The Wyoming highway commission has expressed great interest in the project and is assisting by supplying information on all highway construction in Wyoming and sending samples of sand and gravel from all over the state.

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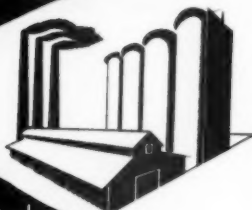
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Research

(Continued from page 127)

this paper by the late Thaddeus Merriam (*Journal of the A.C.I.*, September, 1939). While he used the occasion to show from Mr. Powers' own data the vast differences in cement, and the great virtues of his sugar test for "hard-burned" clinker, he did make this very significant comment: "Bleeding is a direct evidence of quality and the better a cement, all other conditions being the same, the more it will bleed."

We believe in this he was on the right track and that the aim of his specifications, whether intentionally or not, was to produce a cement that would bleed. This was accomplished by especially hard burning, whether or not his sugar test proved this or not. He also specified a small percentage over No. 200-mesh size, with the intention of getting a relatively coarser ground cement. Both these provisions would make for a slower hydrating cement, or one in which the settling process would proceed as long as possible, before the agglomeration or setting interfered with sedimentation. His sugar test would disclose the most readily available lime, and its presence would certainly affect the pH value timing. Also, in discussing the effect of calcium chloride, which Mr. Powers said increases the value of W_1 (the water retained in the paste) Mr. Merriman said: "It should be remembered that the principal effect of this salt is its action in converting the alkali hydroxides into neutral chlorides, and thus removing them from the picture. The overall effect is thus to cause a marked change in the pH of the solution in which the hydration processes occur. By lowering the pH the hydrolysis of the cement proceeds in a different environment and at a different rate."

This is something like the same thought we expressed in the early part of this discussion, that the concentration of lime (and/or alkalies) in the mixture affects the timing of the agglomeration or setting either favorably or unfavorably, depending upon meeting or passing the neutralization point where the negative charges on silica, alumina and iron



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oxide colloids are balanced by the positive charges of the lime or calcium ions or colloids. In other words, there is a pH value most favorable to agglomeration, and when this is exceeded there is dispersion again because the electrical charges surrounding the original silica colloids have been reversed. That point is reached faster of course, the faster the sol or solution attains neutrality. Leaving out of consideration, for the moment, the alkalies, the desired agglomeration would be affected not only by the amount of lime set free in hydration, but by the speed with which it is released. High limed cements act most speedily because of the excess of lime available, and cements mostly of dicalcium silicate act slowly because the lime is not in excess and is only slowly available. We think some reasoning about the setting of cement is faulty in that it does not take into account that the function of the lime in the wet cement is also to agglomerate or precipitate the gel after it has been initially dispersed with the help of the water, or the sol has been peptized by a dilute solution of lime water.

Denser, Sounder Concrete

It seems to follow logically that if we want a sounder, denser cement paste or mortar or concrete we should aim for (1) a slower acting cement which would make possible as long a period of sedimentation as possible; (2) provide drainage or some other means for getting rid of the bleed water. The first objective could be accomplished possibly as Mr. Merriman sought by harder burning the clinker. It could also be accomplished by more dicalcium and less tricalcium silicate, and by coarser grinding. It could be accomplished possibly with a portland-pozzolan cement, which would at least have the virtue of diluting the lime component of the cement, whether the added siliceous material was reactive or not. It is bound to be somewhat reactive, because all freshly crushed silica is. All these have the effect of slowing up hydration and agglomeration, which would permit longer sedimentation and would not only leave less total water in the concrete but less gel water in the paste. Hence we would have a denser product. Getting rid of the bleed water in some other manner than letting it rise through the mix is, of course, a more difficult matter. However, there is little doubt that it greatly improves the product.

Everyone knows that about the most durable cement products are asbestos-cement shingles and siding, in the process of making which, using very high pressures, practically all the water is squeezed out. High pressure steam curing is another process which rids the product of excess water, although it is seldom thought of in that connection. Yet every engineer knows the affinity of high pressure or high temperature steam for water or water vapor. Therefore, high

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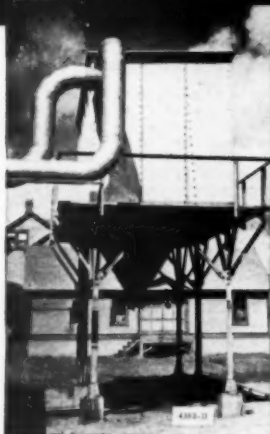
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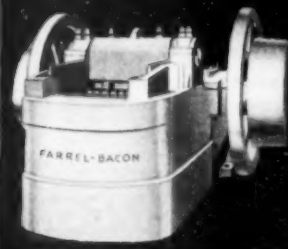
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BA 5

pressure steam curing is a process of gel water removal, not as many think of forcing more water in. At the same time the higher temperature of the vapor drawn from the product probably does help the hydration of the cement particles, but they are drawn or sucked together at the same time, which accounts for the crystalline appearance of high-pressure, steam-cured concrete and the shrinkage that takes place in the process.

When we come to getting rid of excess or bleed water from massive concrete structures like dams, it may be that drain pipes embedded at the beginning of each lift would be more effective in making a dense and durable concrete than circulating refrigerants in similar embedded pipes; it certainly would be less costly. It may be the answer is in perforated rather than watertight steel forms. Or it may be in shallower lifts, which give time enough to bleed out most of the water at the top. This last we think is the poorest solution, but it would be better than none.

A Parting Word

We have presented the foregoing discussion not as the opinion of an expert, or possibly even as helpful in actual concrete practice; it is intended to be helpful to practicing engineers and others interested in better concrete in analyzing some of the results of extensive research work in pure science done for their benefit. We are sure that if they would read or study this material if only as thoroughly as we have done, and that isn't saying a great deal, many ideas and suggestions and questions would come into their minds, and at future sessions of the American Concrete Institute, the American Society for Testing Materials, or elsewhere, some very interesting and instructive discussion would develop—even about the results of "theoretical research."

Gypsum Production

RECORD DEMAND for gypsum products was matched by record production in the third quarter of 1950, when for the first time during any quarter, domestic production of crude gypsum exceeded 2,000,000 tons. Domestic mine production of crude gypsum totaled 2,199,260 short tons, an increase of 36 percent over production in the corresponding quarter of 1949. Production for the third quarter of 1950, as reported to the Bureau of Mines, was as follows:

Crude mined	2,199,260 short tons
Calcined produced	2,947,034 short tons
Cement retarder	496,819 short tons
Base-coat plaster	693,948 short tons
Total board	1,520,833,000 sq. ft.

Among percentage increases reported for the nine months ending September, 1950, over the corresponding period of 1949 were:

Crude mined	23 percent
Calcined produced	31 percent
Cement retarder	11 percent
Plate glass and terra-cotta plasters	39 percent
Base-coat plaster	28 percent
Other building plasters	30 percent

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 22,448,000 bbl. of finished cement in October, 1950, as reported to the Bureau of Mines. This was an increase of 18 percent compared with the output in October, 1949. Mill shipments totaled 24,172,000 bbl., an increase of 14 percent over the October, 1949, figure, while stocks were 30 percent less than the total for the same month of 1949. Clinker production during October, 1950, amounted to 21,430,000 bbl., an increase of 17 percent compared with the corresponding month of the previous year. The output of 22,488,000 bbl. of finished cement during October, 1950, came from 150 plants located in 35 states and Puerto Rico. During the same month of the previous year 19,070,000 bbl. were produced in 146 plants.

Merger to Produce Pumice

SUPER-LITE MATERIAL CORP., Albuquerque, N. M., was recently formed through the merger of Builders' Supply Co. and Pumex Co. of Phoenix, Ariz., and Super-Lite Co. of Calpatria, Calif. An announcement by its officers stated the firm would maintain plants in Phoenix and Calpatria and was establishing a new plant in Albuquerque for the mining of pumice and the manufacture of building block and paving material. The officers of the company are Roy Cook, president; David F. Wallace, treasurer; and Gilbert Olson, secretary.

The new corporation was financed in part with funds (\$50,000) of the Reconstruction Finance Corp., according to recent newsmen reports which have been critical of the venture and which have given publicity to the fact that Mr. Wallace is a brother-in-law of President Truman who allegedly became interested in pumice as a material that might gain overnight acceptance for possible shielding properties in event of atomic attack. The company obtains its raw material from lands leased on the Santa Clara reservation near Santa Fe.

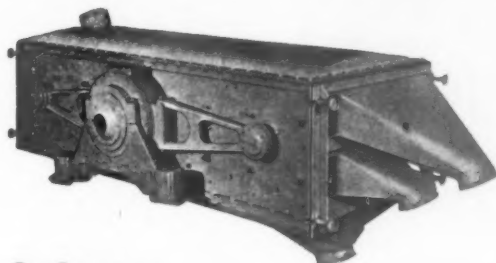
Mr. Cook was active in Democratic politics in New Mexico prior to World War II, served in the navy during the war, discharged in 1947, and then returned to Albuquerque where he met Mr. Wallace, as stated in recent newspaper reports.

Sponsors Scholarship

THE BOARD OF DIRECTORS of the Iowa Agricultural Limestone Association recently voted in favor of sponsoring a scholarship award for an agricultural student of Iowa State College. An expenditure of \$200 from association funds is to be used as a scholarship award to a senior student of the agricultural division who is majoring in the study of agronomy.

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MANUFACTURERS NEWS

Bemis Bro. Bag Co., St. Louis, Mo., announces that **George N. Roberts, Jr.**, formerly office manager in St. Louis, has been appointed office manager of the plant and sales division in Los Angeles, Calif. He replaces **C. J. Wassilak**, who has returned to active duty in the finance section of the Army at Seattle, Wash.

Lincoln Electric Co., Cleveland, Ohio, announces that **James William Brooks** has been transferred from the Boston District to the Indianapolis district as head of sales and engineering. **Thomas I. Dempsey** has joined the Cleveland sales staff as a special field engineer, and **John F. Kotchian** has been transferred from the Cleveland district to Chicago as a welding engineer.

Marion Power Shovel Co., Marion, Ohio, has named **J. L. McDermott** as district sales representative in eastern Missouri and southwestern Illinois, with headquarters in St. Louis, Mo.

Air Reduction Co., Inc., New York, N. Y., has under construction a new manufacturing plant at Union, N. J., for use by the Airco equipment manufacturing division for manufacture of welding and cutting torches, tips, regulators, oxyacetylene cutting machines, etc.

Arkell and Smiths, Canajoharie, N. Y., has announced the appointment of **Tom W. Brown, Jr.**, as Southern sales manager. He had previously been Texas divisional sales manager and has moved his headquarters from Houston, Texas, to Mobile, Ala.

The Dorr Co., Stamford, Conn., has moved its Eastern sales offices to the general office at Barry Place, Stamford, Conn. A branch office will be continued at 570 Lexington Ave., New York, N. Y.

Gardner-Denver Co., Quincy, Ill., has established a plant at Brantford, Ontario, Canada, which will be operated by **Gardner-Denver Co. (Canada) Limited**, to provide increased service for its Canadian business.

Swan-Finch Oil Corp., New York, N. Y., has announced the death of **Ernest V. Moncrieff**, former president, who passed away on November 5 at the age of 60. He had been with the company for 35 years, serving as president from 1930 to 1948.

Union Wire Rope Corp., Kansas City, Mo., has opened a branch office and warehouse in Jacksonville, Fla., with **George Golay** as district manager. **Melvin Hass** has joined the Jacksonville sales staff and has been assigned to the territories of North and South Carolina, Georgia and Alabama. **D. E. Bedford** has been transferred to the eastern Pennsylvania and New York territory from Iowa and Nebraska where he has served several years. **Eugene R. Rhue** has succeeded **Mr. Bedford** in the Iowa-Nebraska territory.

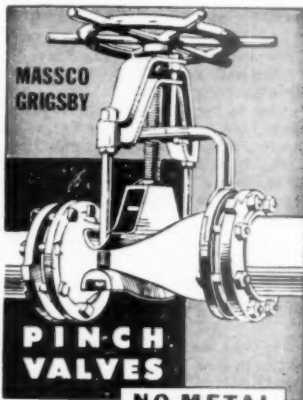
Hobart Bros. Co., Troy, Ohio, has started operations of new facilities at Troy to test its products at temperatures ranging down to 65 deg. below zero. Testing equipment consists of a graphic thermometer, an indicating potentiometer, a two-way sound system, and an inspection window.

St. Regis Paper Co., New York, N. Y., announces construction of a new mill at Jacksonville, Fla., and installation of two kraft paper machines at Pensacola, Fla., at an expenditure of approximately \$30,000,000.

Western Machinery & Engine Co., St. Louis, Mo., has announced formation of its new construction equipment division, under the management of **John H. Heintz**, for sales and service of construction and industrial equipment and supplies in eastern Missouri, southern Illinois and western Kentucky.

The Four Wheel Drive Auto Co., Clintonville, Wis., has appointed **H. G. Engel** as office sales manager. He was formerly manager of the western sales zone and has been succeeded in this position by **V. M. Anderson**, district sales supervisor in northern Illinois.

The B. F. Goodrich Co., Akron, Ohio, announces the retirement of **George W. Vaught**, financial vice-president of the company since 1940. Mr. Vaught plans to retire to his ranch in west Texas where he raises Hereford cattle and Palomino horses.



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The Howe Scale Co., Rutland, Vt., has appointed Walter F. Garlow as sales promotion manager. In order to accept this position, Mr. Garlow resigned as advertising manager of the Hewitt Rubber Division and the Hewitt Restfoam Division, Hewitt-Robins, Inc., Buffalo, N. Y.

Athey Products Corp., Chicago, Ill., has announced the appointment of Tom Shea as general sales manager. He was formerly district representative in the Northeastern states and eastern Canada. A. T. Marchuk, formerly assistant domestic sales manager, has been promoted to domestic sales manager.

United States Rubber Co., New York, N. Y., announces that Joseph A. Conlon has been appointed manager of allied sales for the mechanical goods division, with headquarters in New York, N. Y. He was formerly district sales manager, Chicago branch, and has been succeeded in this position by Edwin D. Meade, formerly manager of Western railway sales.

Chain Belt Co., Milwaukee, Wis., has announced the election of Edmund Fitzgerald as a director of the company to succeed Walter Kasten who passed away recently. Mr. Fitzgerald is president of the Northwestern Mutual Life Insurance Co.

Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich., has promoted E. F. Bentley from contractors' equipment sales manager to sales op-

erations section manager. R. V. Baxley, who has been Mr. Bentley's assistant since 1945, has been appointed to succeed him as contractors' equipment sales manager. Paul Merkert, who has been field sales engineer in Indiana, Illinois, Missouri and Kansas, has taken over the Wisconsin, Minnesota, Iowa, North and South and Nebraska territory from L. H. Wells, who has been named assistant to Mr. Baxley. G. R. Holly has been promoted from sales correspondent to sales engineer in Mr. Merkert's former territory, and W. T. Greene will replace Mr. Holley as sales correspondent. A. E. Jones has joined the staff to handle special assignments.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the election of Dr. H. K. Ihrig as vice-president in charge of research. For the past two years he has been serving as a consultant for Allis-Chalmers in connection with the company's participation in the work of the Atomic Energy Commission. Dr. Ihrig has resigned as vice-president and director of laboratories of the Globe Steel Tubes Co. after 17 years of service.

Borg-Warner Corp., Chicago, Ill., has elected Mathew Keck as a vice-president of the company in addition to his duties as treasurer. Harry L. Emerson has been appointed vice-president in charge of manufacturing of the Rockford clutch division and will also continue as works manager. Richard Brown has been appointed di-

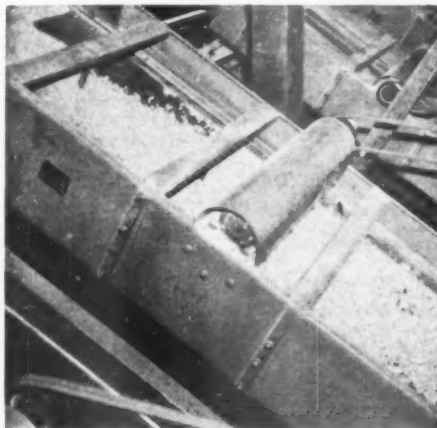
rector of personnel of the Ingersoll steel division at Kalamazoo, Mich. Dee Williams has been named employment supervisor and will continue to handle the employment and training of new employees.

George Hais Mfg. Co., New York, N. Y., announces that W. E. Madden, vice-president, has been elected chairman of the Portable Conveyor Group of the Conveyor Equipment Manufacturers Association for a period of one year. B. W. Reeve, vice-president of Lake Shore Engineering Co., has been elected vice-chairman.

Caterpillar Tractor Co., Peoria, Ill., announces that Louis B. Neumiller, president, was honored recently in San Leandro, Calif., for his 35 years of service. C. L. Best, chairman of the board, presented him with a pin in recognition of his work with the company since 1915. Mr. Neumiller started with Caterpillar as a clerk in the engineering office. He has been president since 1941.

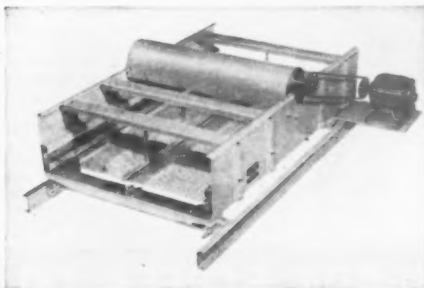
International Harvester Co., Chicago, Ill., has appointed W. W. Black as chief engineer of the field engineering section in the industrial power division. While on this assignment, Mr. Black has been transferred for an indefinite period from the industrial service section which he originally organized and headed. His duties as general supervisor of service, industrial, will be assumed by F. J. Schreck, assistant supervisor.

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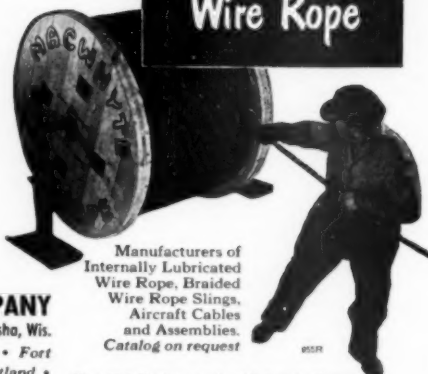
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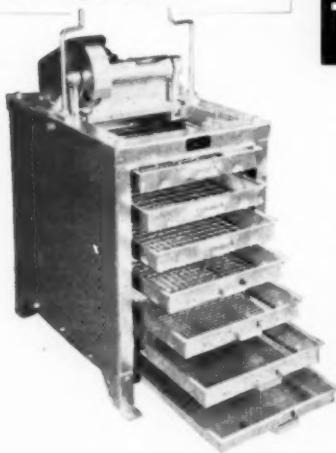


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BOX 186
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N.R.M.C.A. to Convene

The 21st annual convention of National Ready Mixed Concrete Association will run concurrently with the 35th annual convention of the National Sand and Gravel Association. Both will be held at the Hotel Roosevelt in New Orleans, La., February 12-15. The program that follows is that of N.R.M.C.A. only, though joint sessions of the two associations are listed as well. The N.S.G.A. program is given in **ROCK PRODUCTS** (p. 113).

February 12

Annual meeting of the Board of Directors.

February 13

Joint session of the two associations, at which the president will make his annual report and the association executive director and engineering director will make their reports. A lunch will be held, the speaker to be the Mayor of New Orleans, the Honorable DeLesseps S. Morrison.

The separate session in the afternoon will deal with financial affairs. Many new government tax laws will be discussed.

February 14

The morning session will be a "Clinic on Calculating Concrete Proportions" conducted by Stanton Walker and Delmar Bloem. This session is being conducted as a supplement to the annual short course conducted at the University of Maryland by both associations. Basic principles of concrete mix design will be illustrated by a series of problems dealing with calculation of yield, corrections for air entrainment, selecting proportions for specified strength, etc.

The afternoon session will deal with operating problems in the ready-mixed concrete industry. Emphasis will be placed on the problem of mounting truck mixers for maximum pay load consistent with legal limitations on axle load. A round table discussion will cover other problems.

February 15

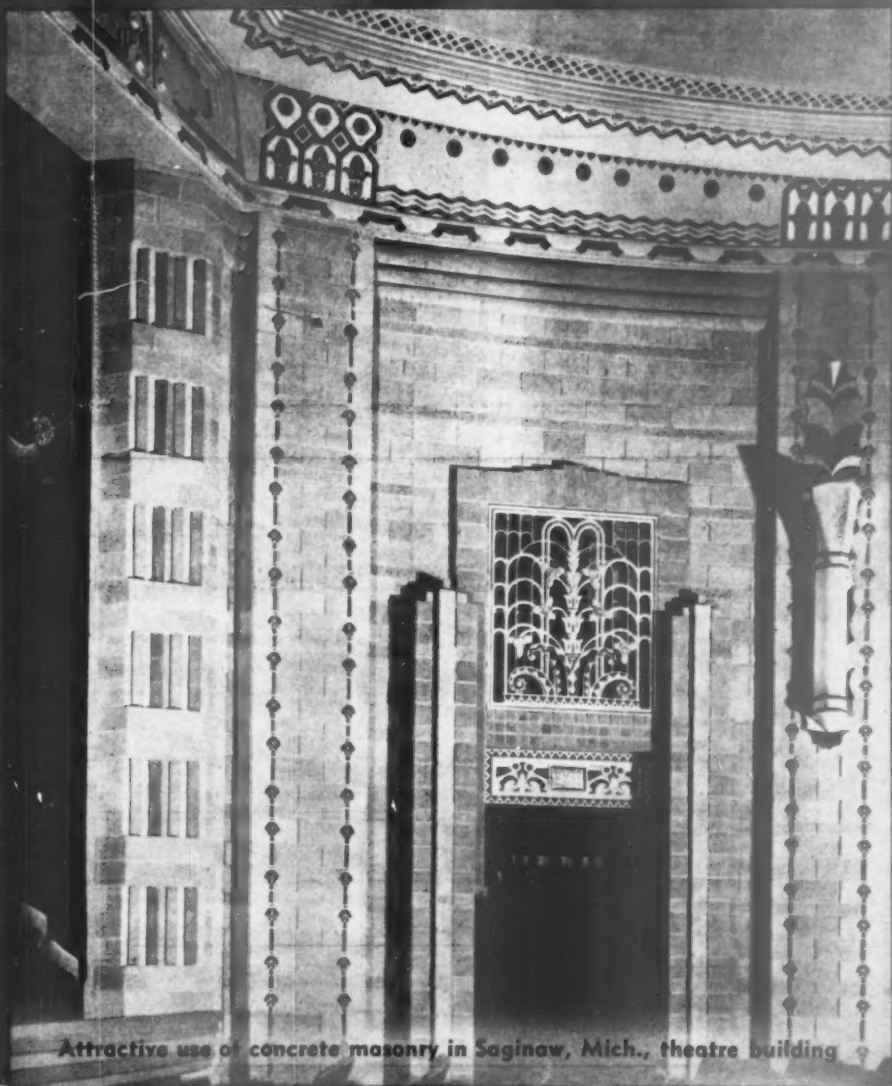
The afternoon session will be the closing one for N.R.M.C.A. It will be devoted to election of officers for 1951 and to presentation of trophies and certificates for safety achievement. There will also be held the clinic on merchandising practices, with special regard to problems introduced by the use of admixtures, air entrainment, and lightweight aggregates. There will be a discussion on merchandising problems growing out of strength specifications and other guarantees of quality.

The program will also include a discussion of the problem of inadequate cement supply in 1950, and a consideration of the prospective cement supply in 1951. Simultaneously there will be a session of the concrete clinic inaugurated at the Wednesday morning session, under the direction of Mr. Bloem.

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Attractive use of concrete masonry in Saginaw, Mich., theatre building



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Duraplastic air-entraining portland cement permits use of a damper mix. Manufacturers find this mix more cohesive, more "rubbery." It holds together better and feeds easily through machines. Duraplastic is ideal for pipe, brick, block, drain tile, silo staves and many other products.



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AIR-ENTRAINING PORTLAND CEMENT

Makes Superior Concrete Products at No Extra Cost



CP-D-118

"THE THEATRE GUILD ON THE AIR"—Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network

INDUSTRY NEWS

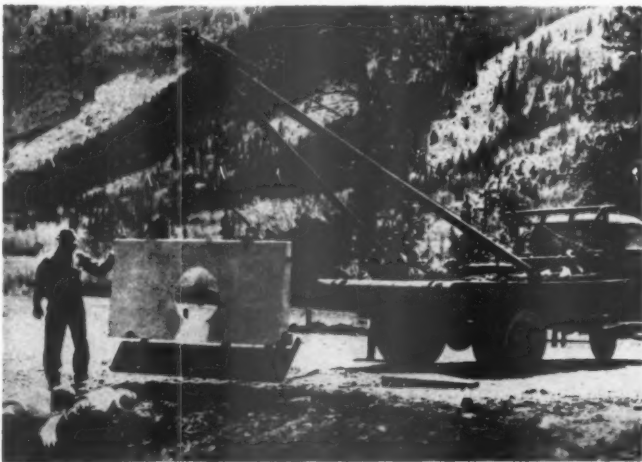
New Method Developed for Making Precast Units

PROTEX INDUSTRIES, Denver, Colo., has announced a new method of pre-casting concrete which the company is applying in the commercial production of a new, patented precast headwall. In a recent test made by the company, a headwall was set on a highway in the Rocky Mountains, on Bert-houd Pass, with only two men. The job was completed in seven minutes, which the company indicates is typical of the savings resulting from its method.

The new development was made as the result of the discovery that by using Class A Protex air-entrained concrete instead of the usual Class B concrete used in headwalls, weight was reduced almost one-half in every size headwall. Regardless of angle or skew of the corrugated metal or concrete pipe, the headwall fits as though cast on the job, the manufacturer claims.

In placing the headwall, the pipe is first set to the headwall. The engineer then provides the degree or angle of cut, after which the pipe is cut to fit perfectly. Special patented lug bolts are used to hold the pipe in place during the grouting process. Grouting is simply handled in a few minutes with the use of a special grouting board.

Precast concrete products manufacturers throughout the United States will be franchised to manufacture the new patented headwall. Manufacturing rights are still being allocated, according to Protex, and local franchise holders will be protected in their territories.



New precast headwall being lowered into place on highway project in Colorado

New Central-Mix Plant

WAMIX, INC. has started production at a new 1000-yd. per day capacity central-mixed concrete plant in Dallas, Texas. Construction on the installation began last summer and the plant was formally opened last month. Wamix, Inc. was formed in March, 1948, by Tom Amis and O. B. English. Heading the equipment list at the new plant are two 2-cu. yd. Koehring tilting mixers, which empty into a 6-cu. yd. collecting hopper. From the hopper an air-controlled clam shell gate allows mixes to be gravity-fed to waiting trucks, of which there are seven in operation. A unique feature of the plant is the batching system whereby each material (water, cement, sand and gravel) is weighed out automatically in its own individual hopper on its individual scale. An automatic dispenser provides the desired quantities of air-entraining agent for each batch. Equipment also includes a 7000 bag (bulk) cement bin, a 430 ton material bin, and a 300 ft. belt conveyor for sand and gravel transfer.

Group Conducts "School"

THE WABASH VALLEY READY-MIXED CONCRETE ASSOCIATION held its annual "School for Operators" at the Rose Polytechnic Institute, Terra Haute, Ind., on December 27 and 28. The program was arranged by Prof. R. E. Hutchins, secretary of the Association. The annual convention of this group will be held at the Drake hotel in Chicago on March 19-20.

Invents Mechanical Mortar Spreader

INDUSTRIAL RESEARCH DIVISION of Washington State Institute of Technology, Pullman, Wash., has announced the invention of a new mechanical mortar spreader. The spreader was recently demonstrated before



40 members of the Washington Concrete Products Association. This new device was designed for use in laying standard building block and is said to effect substantial mortar saving. The spreader, filled with mortar, is set on a previously laid course of unit masonry. The proper quantity of mortar is distributed as the machine advances along the wall. There is no waste and the mortar is laid neatly and uniformly.

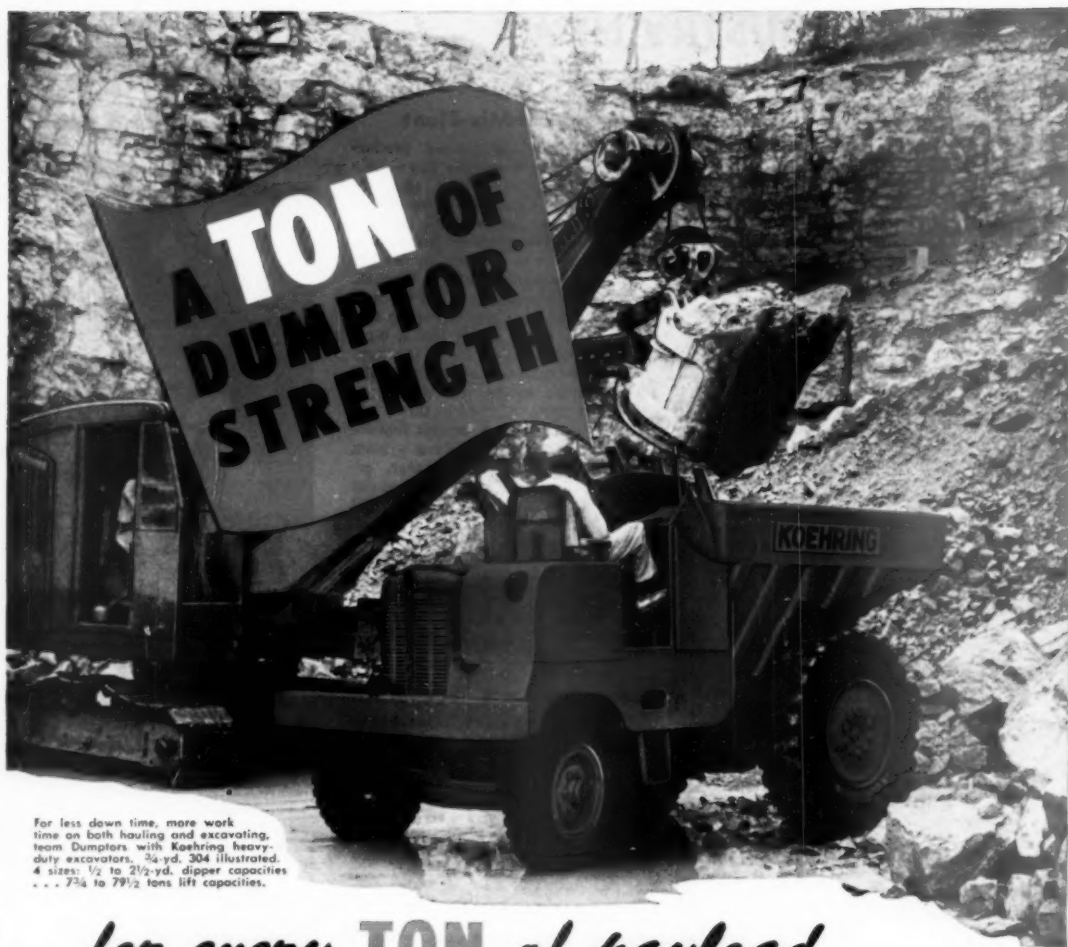
The invention consists of a hopper-body, 16- x 7½- x 9½-in. Two horizontally spaced augers are in the bottom of the hopper, extending its full length. The augers are rotated in such a manner as to carry mortar from the hopper-body and force it through the openings at the rear.

Concrete Firm Improves Winter Operations

CLARK CERTIFIED CONCRETE CO., Baltimore, Md., has installed a commercial steel boiler to insure properly heated ready-mixed concrete, and thus eliminate complaints about mixes being too cold to set. The decision to install the big boiler came when the greatly increased orders of postwar construction proved the old system to be inadequate. Winter month truck deliveries had stepped up from 35 to more than 500 cu. yd. per day.

BEASLEY BROTHERS, Carlinville, Ill., have announced plans to add ready-mixed concrete plant to their welding and machine shop in Carlinville.

THE MARION BLOCK CO. has completed construction of a concrete block plant near Belmont, Ky. The plant is owned and operated by R. Gordon Levi and his son, George N. Levi.



For less down time, more work time on both hauling and excavating, team Dumptors with Koehring heavy-duty excavators. 3½ yd. 304 illustrated. 4 sizes: ½ to 2½ yd. dipper capacities . . . 7¼ to 79½ tons lift capacities.

*...for every **TON** of payload*

Dumptors stand up under the severest shocks of shovel-loading 1½ to 2½ yards of rock at a pass because they're built extra tough for rock handling. There's more than a ton of net vehicle weight for every ton of payload.

All-welded body, sides, ends and bottom are heavily reinforced with 4" channel ribs. More than triple strength has been built into the bottom . . . seasoned 1½" oak timbers are securely bolted between two layers of 5/16" steel plate. Steel-oak-steel construction cushions shocks of rock loading. Free-swinging, kick-out pan

adds another tough 3/16" high-manganese steel plate for extra protection. Dumptor also has: rugged main frame, 8" ship-channels, heavily trussed . . . one-piece steel drive-axle housing and transmission case . . . 4" chrome steel drive axles . . . cast alloy steel "I" beam steering axle. All add extra strength to Dumptor chassis.

Heavy-duty construction like this assures you that Koehring 6-yard Dumptors will stand up under your toughest assignments . . . that there will be little down time with Dumptors on your job. For complete facts, see your Koehring distributor today.

CK122



KOEHRING DUMPTOR®

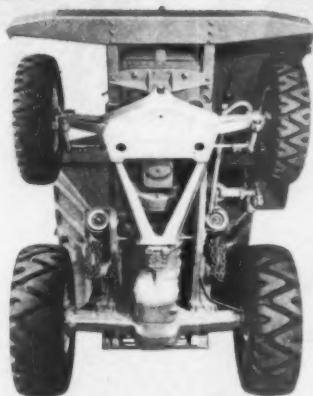
KOEHRING COMPANY, NEWARK, N.J. 07102

CHICAGO, ILL.

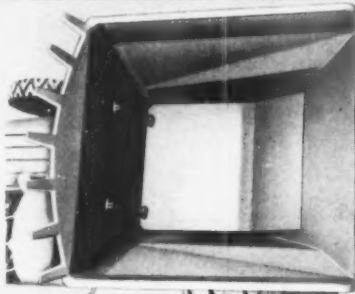
ST. LOUIS, MO.

PHILADELPHIA, PA.

ATLANTA, GA.



NO "SOFT SPOT" on Dumptor's underside . . . 1-piece, cast steel housing protects drive axle and enclosed chain drive. Wishbone supports the skid plate . . . shields the radius rod and the engine crank case . . . and supports the oscillating steering axle.



KICK-OUT PAN adds an extra 3/16" high-manganese steel plate on top of sturdy Dumptor bottom . . . breaks suction of sticky materials for fast, clean dump. Big 8' x 8' top gives easy-to-hit target for fast loading over the side or end . . . with less spillage.



1-SECOND GRAVITY DUMP . . . no slow-acting body hoists . . . no body-hoist maintenance . . . plus same speeds forward and reverse for return shuttle hauling keep production yardage high, costs low with Dumptors.

all welded . . . **PORTABLE** FOR TRANSIT-MIX • CENTRAL-MIX • CONCRETE PRODUCTS

Quickly moved to reduce haul distance of mixed concrete, Johnson Transit-Mix Plant has all-welded, easily-assembled units. Its portable-section Tandem Mix minimizes field bolting . . . dismantling, erecting takes less than half the

time required for moving a bolted plant. All sections are easy-handling width . . . 11' or under, 7' in sizes from 35 to 310 cu. yds. can be arranged for 2, 3 or 4 aggregates. Central cement compartment holds 61 to 125 bbls. Check its flexibility for transit-mix, central-mix or concrete products operation. See your Johnson distributor, or write us for complete facts.



JOHNSON CLAMSHELLS HANDLE EXTRA TONNAGE *because:*

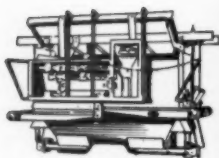


- Large diameter sheaves, with fully sealed needle bearings, reduce friction power loss, deliver full power to cutting lips.
- All-welded construction improves bucket balance, lowers center of gravity, lets teeth dig in straight and deep for capacity load in any material.
- Hard manganese cutting edge, welded to lips, gets tougher with use, assures long life.
- 9 sizes . . . 3/4 to 2 1/2-yard . . . General Purpose, Wide Rehandling and Heavy-Duty Digging types. Write for new catalog.

(Kooling
Sachdamp)

c. s. JOHNSON co.

CHAMPAIGN,
ILLINOIS



WEIGHING BATCHERS

New standards of accuracy and efficiency from a roadbuilders batcher to completely automatic, recording weighing batchers for high production ready mixed concrete operations.



CENTRAL MIXING PLANTS

BUTLER PLANTS are widely recognized as examples of brilliant engineering in a great variety of materials handling problems. Here the experience of the BUTLER Engineer is invaluable.



AGGREGATE PLANTS

Highly portable, quickly erected, BUTLER Aggregate Plants save time and money in meeting high pressure paving schedules.



CEMENT AERATOR

Compressor, engine, pump and complete controls all in one compact, space-saving unit. The BUTLER CEMENT AERATOR is essential to a smooth flow of cement.

TO GET THINGS DONE IN '51— SEE BUTLER BIN

1951 will be a year of action and unprecedented production. The highway program is expanding at an accelerated pace. Demand for Ready Mixed Concrete is climbing week by week for building construction is still far behind the nation's requirement.

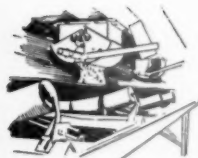
Production schedules such as these mean modern equipment—and modern equipment means BUTLER and BUTLER Engineered Design.

In your plans for new plants—or for modernizing existing equipment "to get things done in '51" it's the soundest of common-sense to consult the BUTLER engineer.

BUTLER BIN CO.

989 Blackstone Avenue

WAUKESHA, WISCONSIN



BUTLER BIN GATES

Bin gates are subject to heavy wear. Keep extras on hand to avoid shutdown. BUTLER makes them in rotary, clamshell, roller and radial types.



READY MIXED PLANTS

Ready Mixed Concrete Plants for every production level—engineered by BUTLER for the highest efficiency and lowest cost operation.



BULK CEMENT PLANTS

A wide range of capacities for every roadbuilding job. Faster batching, split-second accuracy. Shown is the CR-37-58 providing 650 bbls. capacity.



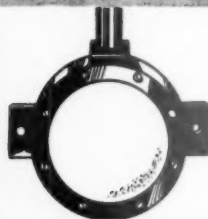
CONCRETE PRODUCTS PLANTS

BUTLER engineers have an international reputation for highly efficient design in Concrete Products Plants. BUTLER offers an engineering service that assures a maximum profit.



THE NEW BUTLER '102' SCOOP

Faster forward travel (11 miles an hour), a turning radius of only 6'3", the new BUTLER '102' is tops in maneuverability and efficiency.



BIN LEVEL INDICATOR

A new BUTLER development, a truly trouble-free, positive, accurate Bin-level Indicator. Works successfully with a great variety of materials.

BIG PAY LOADS

that stay within weight limits



New Smith 6 1/2 Yard LOADLIMIT Model. 8 1/2 Yards as Agitator.

- ★ Has Approved NRMCA Rating
- ★ Carries Full Rated Load
- ★ Stays Under Highway Weight Limits
- ★ Low Initial Cost
- ★ Low Operating Costs
- ★ Easily Convertible to a Standard Smith-Mobile

WITH SMITH **LOAD LIMIT** MODELS

You can haul BIGGER PAYLOADS at less cost per yard with new Smith LOADLIMIT Model Truck Mixers. These dependable machines are the same as standard Smith-Mobiles with a few unnecessary parts removed . . . parts you can readily sacrifice in favor of lighter weight. When the mixer is mounted on the proper truck, the entire unit stays within the weight limitations of most states. The LOADLIMIT models have the well-known Smith-Mobile sturdy construction and performance. Lightweight? Yes — but not too light for tough, everyday service. Available in ALL Truck Mixer sizes . . . 2, 3, 4 1/2, 5 1/2 and 6 1/2 yards. All carry approved NRMCA rating plates. And all can easily be converted to standard Smith-Mobile models. Get the facts! Write for Bulletin No. 247.

The T. L. SMITH COMPANY
2885 N. 32nd St., Milwaukee 45, Wis., U.S.A.

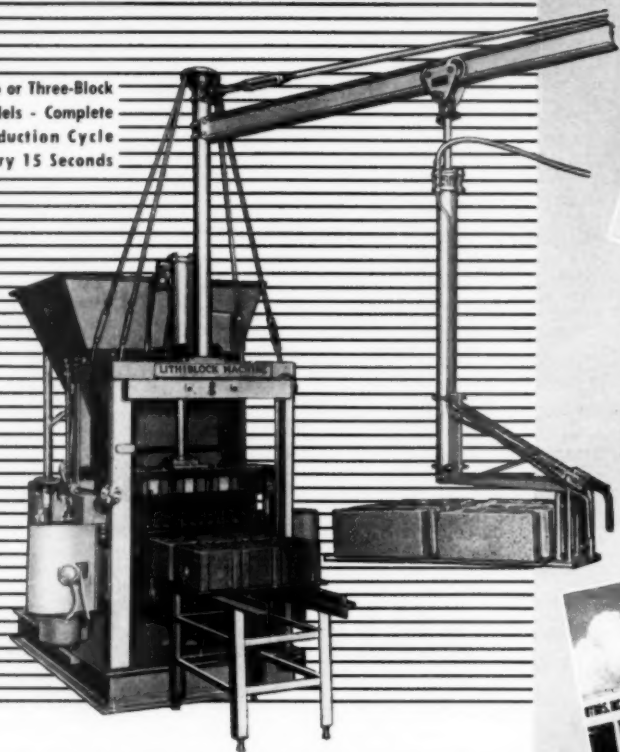
SMITH MOBILE

For BIGGER and BETTER Concrete Mixers and Truck Mixers Look to SMITH

LITH-I-BLOCK

The Talk of the Industry

Two or Three-Block
Models - Complete
Production Cycle
Every 15 Seconds



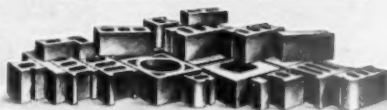
GET SET TO GO

These are critical times when you'll most appreciate the advanced features of the Lith-I-Block production unit—not only for the way it works, but also for the product it makes.

It's the one machine that is engineered for 100%-vibratory production, with everything done in measured sequence by trouble-free automatic means. Cuts the labor cost, cuts the cost of wear and tear, cuts the cost of pallets—and gets more block per sack of cement! The best of block, too—the kind that are processed uniformly under 100% vibration—the kind that architects, contractors, masons, and builders go out of their way to ask for.

Now is the time to get set with Lith-I-Block for the demanding days ahead. Get set with the times, get set with Lith-I-Block.

**FITS THE
AGE**



LITH-I-BAR COMPANY

HOLLAND - MICHIGAN

DEPT. CP-1

LOOK! JOE ... I made this cut
with my Clipper in 5 seconds!



SOLD DIRECT
from Factory to User

PACKED WITH EXCLUSIVE FEATURES

DUSTLESS CUTTING WITH MODEL HD

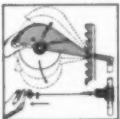
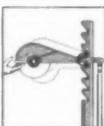
PRESSURE EQUALIZER

Makes your blades last longer... because Equalizer Spring automatically cushions blade pressure whether cutting HARD or SOFT materials. Guarantees faster cutting, longer blade life. Outstanding for blade economy.



SELECT-A-MOTCH

One man easily adjusts Cutting Head to desired height... whether cutting Stone, Concrete Block, Glazed Tile or Quarry Tile. Operator's hands, merely guide - all weight supported by rear Connecting Bar.



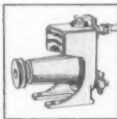
ADJUST-A-CUT

Merely pull the knob - and the Cutting Head is free for longer or setting at any desired angle. Release the knob - and head is locked in desired position. Another Clipper Patented Feature.



SAVE-A-BLADE DIAL

Just turn the Save-A-Blade Dial to the hardness of the material you are cutting and the Clipper Pressure Equalizer Spring automatically sets the tension, to guarantee faster cutting and longer blade life - whether the material is HARD or SOFT. Whether using Diamond or Abrasive Blades... Cutting Wet or Dry with the Dustless Model HD. (Not on Model C Series.)



WET-OR-DRY PUMP

NO NEED TO STOPPAW! Still when cutting dry. No maintenance. Factory Sealed. An exclusive Clipper development. Patented Water Application Unit systematically controls water flow.



Yes...

CLIPPER MASONRY SAWS
Make *Any* Cut Quickly and Easily!

Yes, you can slice through the hardest materials in seconds with the New Clipper Masonry Saws. Smoother, faster cutting action than ever before. You'll find Clipper's the Genuine answer to any masonry cutting problem. Contractors agree on the New wet or dry cutting Model HD for the 100% Answer to ALL masonry problems. Actually the HD is Two Saws In One—it will meet your DUSTLESS cutting requirements in confined areas and will cut dry for outside operations. Every Clipper Masonry Saw is GUARANTEED, "To provide the Fastest Cut... at the Lowest Cost... with the Greatest Ease... Any Time... Any Where!"

Only *Clipper* Has **NINE Models**
To Choose from!...

Not ONE Model—Not TWO Models...

But NINE separate and distinct Clipper Saws for you to choose from. Each completely different in price, in size, in performance. Select the Clipper Model that EXACTLY SUITS YOUR particular needs!



DRY ABRASIVE BLADES
WET ABRASIVE BLADES
DIAMOND BLADES

Cut DRY—or cut WET...

Cut with ABRASIVE Blades—or with DIAMOND Blades...

In the more than 50 standard and special CLIPPER Blade specifications you will find THE EXACT SUPERIOR BLADE to cut YOUR materials AT THE EXACT SPEED YOU require!

FREE TRIAL

Nine Clipper Models available on FREE TRIAL. Priced from \$195... Shipped Direct from Coast to Coast Clipper Factory Branches.

TEAR OFF AND MAIL

CLIPPER MANUFACTURING CO.
2807 N.W. WARWICK • KANSAS CITY 8, MO.

Send TODAY information on the FREE TRIAL offer and literature and prices on the 1950 Clipper Masonry Saws.

NAME _____

COMPANY _____

STREET _____

CITY _____

ZONE _____

STATE _____

Clipper

**NATION-WIDE
DIRECT
FACTORY SERVICE**

MANUFACTURING COMPANY
KANSAS CITY 8, MO.

PHILADELPHIA • CLEVELAND • AUSTIN, TEX. • PITTSBURGH
WASHINGTON, D.C. • CHICAGO • ST. LOUIS • SAN FRANCISCO
NEW YORK • DETROIT • CINCINNATI • ATLANTA • BOSTON

MACKS make light of heavy loads . . .

Big Mack super-duty trucks make the hard jobs look easy...because in design and construction they incorporate numerous outstanding features that contribute to easy maneuverability, ease of control and positive traction regardless of terrain.

Powerful Diesel Engines! Hydraulic Power Steering! Air Assist Clutch! Flexible Rubber Shock Insulators! Mack's famed Balanced Bogie and Power

Divider. All are Mack features that assure power and strength for the heaviest loads; flotation and traction for the most slippery mud or sand.

Your nearest Mack branch or distributor will give you the full story on what Macks can do for you in trouble-free, uninterrupted schedules... greater profits through greater output at lower cost. You'll find it's a story well worth hearing.



Only Mack gives you all the advantages of the famed Balanced Bogie. Positive traction because of exclusive Power Divider. No spring twist because of Mack Rubber Shock Insulators. Inherent flexibility eliminates chassis distortion. Extended tire life because of uniform tire loading. Minimum maintenance because of simplicity of design.



...outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York; Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



BLUE BRUTE USERS AGREE: "It's a Great Line of Mixers!"



FOR CENTRAL MIXING
This modern plant of the Clark Certified Concrete Company, Inc., of Baltimore, Md., produced 125,000 yds. of pre-mixed concrete during the past year. Vice-President Duncan writes: "Your Blue Brute 84-S Stationary Mixer has proven entirely satisfactory. Maintenance costs have been practically nothing."



FOR PORTABLE MIXING. Le Roy W. Vival, chief engineer of the O'Sullivan Rubber Corporation, Winchester, Va., reports: "We are extremely gratified by our Blue Brute 3 1/2 Tilt Mixer, which has had two years of constant, severe use. It is extremely mobile, well constructed and performs excellently. Long exposure has not decreased its efficiency. The mixing cycle is fast and the mix consistently uniform. It is a pleasure to endorse and recommend this equipment."



FOR TRANSIT MIXING. President Bob McCorkle of the Abilene, Texas, Concrete Company, gives his reasons for re-ordering Blue Brute Hi-Up Truck Mixers: "We have compared competitive makes on our jobs and find your Hi-Ups best in every way. Maintenance costs have been negligible. Just purchased your first chain-drive Hi-Up and find it even better than the older machines — faster charging and discharging, easier to maintain and smoother running."



FOR PLACING. In building the Washburn vehicular tunnel under the Houston, Texas, ship channel, the "Trench method" of construction was used. The last yard or two of concrete placed in each of the section joints had to be placed straight upwards — a tricky pouring problem. Merritt-Chapman & Scott Corporation reports an easy solution was found with the aid of a Blue Brute Pneumatic Placer, which performed excellently.

Yes, among Blue Brute owners it's a never-ending story of more concrete at lower cost, trouble-free operation, time and money saved in every detail of mixing operations. Why not look into this proof that *there's more worth in Worthington?* See your nearby Worthington-Blue Brute Distributor, or write for bulletins on mixer types in which you're interested.



NATIONAL
READY MIXED
CONCRETE
ASSOCIATION

Worthington Pump and Machinery Corporation
Construction Equipment Department
Harrison, New Jersey

Distributors In All Principal Cities

WORTHINGTON



BUY BLUE BRUTES





WELCOME

to BOOTH 158 at the
CONCRETE INDUSTRIES EXPOSITION



IN CLEVELAND GET THE LATEST DATA ON SPECIAL CEMENTS AND MASONRY PAINTS

While attending the Concrete Industries Exposition, be sure to visit Medusa's Booth No. 158 and get the latest data on special cements and paints for masonry surfaces. Bring your concrete problems along, and we'll do our best to help you solve them. Above all, be sure to ask for literature on these special cements that save money by doing special jobs better:

MEDUSA WATERPROOFED GRAY PORTLAND CEMENT
MEDUSA HIGH EARLY STRENGTH CEMENT
MEDUSA WHITE PORTLAND CEMENT
MEDUSA WATERPROOFED WHITE PORTLAND CEMENT
MEDUSA STONESET CEMENT
MEDUSA BRIKSET CEMENT

In addition, complete information, literature, color selectors and dealer helps will be available on these Medusa paints for decorating concrete, stucco, and masonry.

MEDUSA PORTLAND CEMENT PAINT MEDUSA RUBBER BASE PAINT

If you can't make it to Cleveland, January 22-25, we'll be glad to mail you information on the above products. Drop us a line today.

MEDUSA PORTLAND CEMENT COMPANY
1029-2 MIDLAND BUILDING • CLEVELAND 15, OHIO

You can build BETTER with

MEDUSA PRODUCTS

REG. U. S. PAT. OFF.



Another Leader IN THE PRODUCTS INDUSTRY PREFERS **BESSER VIBRAPACS!**



Officials of the Duchini Products Plant: A. Duchini, Owner; Adelmo Duchini, Plant Supt.; Guido Gianoni, Office Manager; V. James Gianoni, Sales Dept.; Albert Gianoni, Ass't. Foreman.

Erie Pennsylvania Plant Installs Second Vibrapac

Avellino Duchini has just installed a second Vibrapac in his Erie Pennsylvania Products Plant. Since 1941, he has demonstrated the versatility of the Vibrapac by producing all standard size units, as well as many special units, including Soffit Block for floors and roofs. The latter are used in connection with Acrow Telescopic Centers furnished by Besser.

In addition to the recognized quality of Vibrapac Block, an excellent promotional campaign has helped to increase the demand for block in the Erie district, justifying the second Vibrapac.

BESSER MANUFACTURING CO.

Complete Equipment for Concrete Products Plants

115-51st Street, Alpena, Michigan, U. S. A.

See SOFFIT BLOCK and ACROW CENTERS Display at the BESSER BOOTHS, NCMA Convention, Jan. 22-25, Cleveland, Ohio



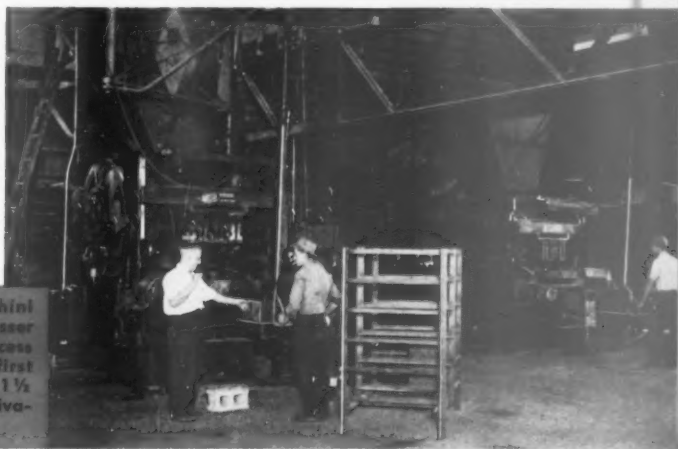
Exterior view of Duchini plant showing stock piles of Vibrapac Block.



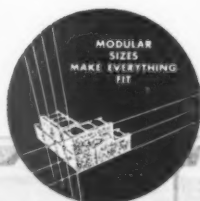
Erie Penna. gymnasium. Built with Celocrete Block supplied by Duchini.



Workman laying Soffit Block on Acrow Temporary Steel Floor Centers supplied by Duchini.



Interior view of Duchini plant showing two Besser Vibrapacs—one in process of installation. The first Vibrapac is producing 1 1/2 million 8" units, or equivalent, per year.



BESSER

BATCH MIXERS

SKIP LOADERS

BLOCK & BRICK CUBES

SUPER VIBRAPAC

SINTERING PLANTS

ACROW CENTERS

ROOF TILE MACHINE

Here's the

New

BIGGER PAYLOADS
TROUBLE-FREE OPERATION
LOWER INVESTMENT
GREATER PROFITS

LESS DEAD WEIGHT—By careful re-design every bit of excess weight has been eliminated to give you a Hi-Boy that is sturdy and strong and will let you haul bigger payloads at lower cost per yard. You can use a lighter, less expensive truck and reduce your capital investment without sacrificing Hi-Boy quality or performance.

NEW CHAIN DRIVE—Double-strand roller chain automatically compensates for misalignment between drum and drive shaft caused by operation over rough roads. Easy to lubricate and maintain.

NEW TRANSMISSION—This new Blaw-Knox engineered transmission is by far the finest ever put on a truck mixer. It is precision made to automotive tolerances, easy to shift, silent in operation, compact, sturdy and durable. This simple design has a total of only *seven* gears and consists of three self-contained elements that can be separately removed or replaced if adjustment or repair is ever required.

LARGER HOPPER OPENING—You get split-second charging through this new enlarged hopper opening. Completely unobstructed, it permits fast, free flowing of material into the drum.

NEW WATER VALVE—One simple 3-way, non-by-passing piston type valve permits flow of mixing water, flush water or complete cut-off controlled by a single handle. Fast operating handle moves only 6 inches for complete cycle. Valve locks in any position—cannot leak or vibrate out of setting.

the Revolving Hopper with the GUARANTEED SEAL!

The Blaw-Knox Hi-Boy is the only truck mixer with a seal **GUARANTEED FOR ONE YEAR!** It has the only rear end hopper that operates safely while submerged in concrete! It is the only truck mixer with a Revolving Hopper—the revolutionary feature that ends tail gate trouble by eliminating the tail gate, and permits faster charging and discharging of even zero slump concrete.

INSTANT CONTROL—A flick of the lever inverts the hopper for discharging or positions it for charging without any effort on the part of the operator. It's automatic!



BLAW-KNOX

Division of Blaw-Knox Company
Farmers Bank Bldg., Pittsburgh 22, Pa.

New York • Chicago • Philadelphia • Birmingham • Washington • San Francisco



BLAW-KNOX *Hi-Boy*

LITE-WEIGHT

TRUKMIXER

THE New Blaw-Knox Hi-Boy is the lightest weight of all standard complete truck mixers and yet it contains all the high production, low maintenance features of the revolving hopper design. This new truck mixer has been designed to reduce the weight of the 3-yd. model by a *full ton* and the 4½ yd. model by *half a ton* with no sacrifice of rugged Hi-Boy construction.

You Ready-Mix operators know the profit-per-yard advantages of lightweight truck mixer design—you can haul *maximum payloads* with a lower over-all capital investment, less operational cost, and without exceeding legal highway load limits. With the Hi-Boy Trukmixer, you get the fast charging, fast discharging features that speed your operations, plus the *guaranteed* seal that eliminates tail gate troubles and maintenance headaches.

Your nearest Blaw-Knox distributor will describe all the big-profit features of the new Hi-Boy. See him today for the complete story.



*Every dog
has it's day-*



**This is the day of
The Continuous
Mixer**

● Not any continuous mixer, of course, but the Yoder. It will make you forget everything you have been told, and everything you *think* you have known about continuous mixers.

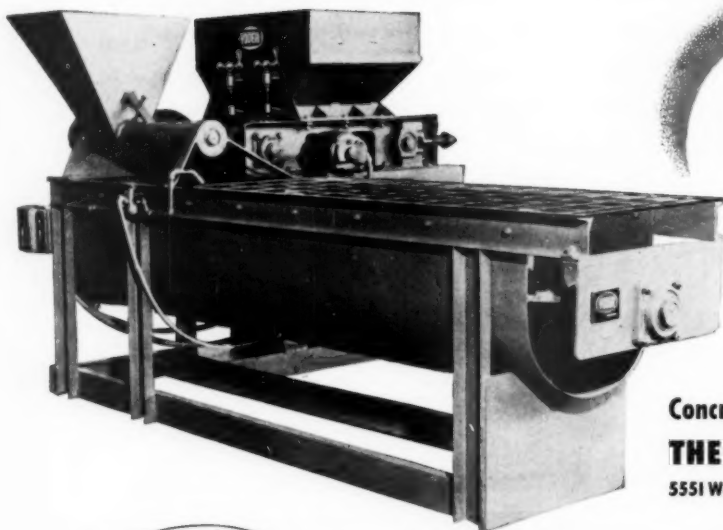
Because of several new and revolutionary features, the Yoder has brought mixing under closer control, made results surer, operation easier and simpler.

Vibrating, non-clogging, positive feed is only one of these features. It reduces aggregate, regardless of moisture contents, to constant volume—a positive improvement on feeding by weight, yet at no extra cost to you.

The thoroughness of the mixing action is another new feature, of great value in making scarce and precious cement go farther. This was proved by tests recently reported by the City of Detroit Testing Laboratory. These tests showed 50% increased strength, with the same amount of cement as used in a conventional batch mixer. This obviously makes it possible to obtain equal strength with more economical mixes.

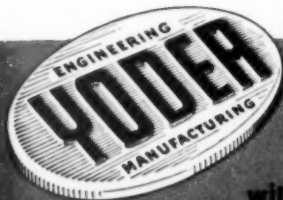
The Yoder saves in other ways: Only half the first cost of a batch mixer of similar capacity—less than half the wear and maintenance cost. Also, by eliminating expensive weighing batchers and conveying equipment between bins and block machine.

See this mixer, (also other Yoder machines) at the forthcoming Show in Cleveland *January 22-25*. Booths 1, 2 and 3. Study the facts. Then judge for yourself. Literature on Request.



**See it at
the show in
Cleveland
Jan. 22-25**

**Concrete Machinery Division
THE YODER COMPANY**
5551 Walworth Ave. • Cleveland 2, Ohio



CONTINUOUS MIXER

with Vibrating Constant Volume, Non-Clogging Belt Feed

N.C.M.A. CONVENTION PROGRAM

And Concrete Industries Exposition

THE 31ST ANNUAL CONVENTION of the National Concrete Masonry Association, together with the 7th Concrete Industries Exposition to run concurrently at the Cleveland Public Auditorium, January 22-25, is expected to be the largest ever held. Weeks before the scheduled opening, all exhibit space was taken and an additional area in an exhibit hall beneath the Auditorium's arena was provided. The program for the convention is given below, and after it is given the list of manufacturers who will exhibit. This list also includes booth numbers, a description of the products to be displayed, and names of company representatives in attendance.

January 22

Registration opening day and every day of the convention will take place beginning at 8:30 a.m. at the Lakeside entrance to the Cleveland Public Auditorium. Admission to convention sessions is to be by badge only. The first session will begin at 10:00 a.m. when the president of N.C.M.A., Glenn C. Barnes, will call the meeting to order. Reports by the association staff and by representatives of local, state and regional concrete masonry associations will fill the remainder of the morning.

The formal opening of the Concrete Industries exposition will be at 1 p.m. and it will remain open until 6 p.m. The same hours will be in effect each of the convention days.

A number of aggregates meetings will be held during the afternoon also, including cinder aggregate, presided over by Edmund H. Brooke, National Brick & Supply Co., Washington, D. C.; Haydite aggregate, presided over by G. W. Kulhavy, The Carter-Waters Corp., Kansas City, Mo., and Enslite aggregate, presided over by Walter Cain, Birmingham Slag Co., Birmingham, Ala. In the evening, a get-together party will be held at the Hotel Carter, sponsored by the association.

January 23

Philip Paoletta, chairman, publications and publicity committee, will preside. Experiences and observations in 25 years of marketing concrete masonry units in the Detroit area will be the topic of Herbert J. Vincent, Cinder Block, Inc., Detroit, Mich. Other talks to be given during the morning session will include the visual



Cleveland Vibrator Co. will have a booth similar to this at the Concrete Industries exhibition

aid program of the Association of Collegiate Schools of Architecture, by Prof. D. K. Sargent, Syracuse University; "2000 Concrete Masonry Homes Constructed in Two Years," by Gustaf Blomberg, Basalt Rock Co.; merchandising policies to be discussed by C. D. Franks, vice-president for promotion, Portland Cement Association, and "What Makes Star Salesmen Tick?" by W. S. Crean, Newton Centre, Mass.

Further aggregate division meetings will be held at 3:00 p.m. These will include Celocrete, presided over by J. A. Crabbs, Austin Crabs, Inc., Davenport, Iowa; pumice section, presided over by J. E. Counts, Pumice Aggregate Sales Corp., Albuquerque, N. M.; Superock section, presided over by J. S. Bailey, Concrete Manufacturing Co., Atlanta, Ga., and Waylite, presided over by P. E. Bohm, Concrete Products Corp., Mishawaka, Ind.

The annual banquet will begin at 7:30 in the Rainbow Room of the Hotel Carter.

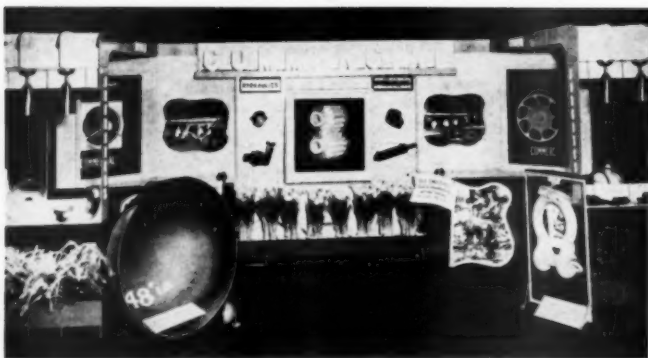
January 24

Technical problems will be aired at the morning session. R. A. Utiger, chairman, technical problems committee, will preside. The first talk will be "Progress in the Manufacture of

Lightweight Aggregates by the Sintering Process" by Reed W. Hyde, president, Sintering Machinery Corp., Netcong, N. J. This will be followed by "New Developments in Automatic Cement Conveying Equipment," by R. A. Hawk; "Determining the Efficiency of Your Plant Operation," by Harvey Black, Domine Builders Supply Co., Rochester, N. Y., and "Some Applications of Reinforced Concrete Masonry," by C. J. French, assistant engineer, N.C.M.A.

January 25

The president-elect will open the session and preside over the final day of the convention. Present trends in pension plans will be discussed by I. Austin Kelley III, New York City. Labor-management relations will be covered by J. A. Wilder and H. A. Feldmann of Wilder-Feldmann, Inc., Chicago, Ill. "The Use of Concrete Masonry Units in Prestressed Concrete" will be the topic of R. H. Bryan, consulting engineer, Nashville, Tenn. Results of a survey of the concrete masonry industry will be presented by W. M. Avery, Pit & Quarry, Chicago, Ill. The final talk will be a discussion of precast lightweight insulating roof slabs by A. W. Schultz, Zeidler Concrete Products Machinery Co., Clear Lake, Iowa.



The Commercial Shearing & Stamping Co. booth will feature steel pellets as well as the castings shown in the picture

Adrian Peerless, Inc. Booth 146

New type wall reinforcing trade named "Wal-Lok." Roy Briggs and Wendell Ladd.

All Concrete Products Co. Booth 35

American Bildrok Co. Booth 45

American Sta-Dri Co. Booth 13

Demonstration of waterproofing mineral coating for exterior or interior wall surfaces. E. B. Castle, George Cramer, Jr., Allen Cramer, R. L. Sturgis.

Basalt Rock Co. Booths 9-10-11

Introduced will be Strestcrete integral steel frame buildings and bridge planks. Three panels of Strestcrete tongue and groove siding in various thicknesses, bridge planks 26 ft. long and several Strestcrete floor and roof slabs. A. G. Streblow, D. O. McCall, Hector MacLean, Maurice French, Lloyd Lindquist, Norman Smith and H. A. Price.

Besser Manufacturing Co. Booths 97-98-99-100-111-112-113-114

Blaw-Knox Co. Booths 125-126-127-160-161-162

Butler Bin Co. Booth 102

Calcium Chloride Association. Booth 33

Cedar Rapids Block Co. Booth 42

Celotex Corp. Booth 12

Chain Belt Co. Booths 103-108

Improvements made recently on Rex Adjusta-Hite and Hi-Discharge Moto-Mixers; operating unit of the Adjusta-Hite model. Movies of both units in operation will be shown. A. K. Thomas, D. A. Kalton, Claude Vorpohl, R. R. Horton, E. A. Eichstaedt and Jack Heaps.

Cleveland Vibrator Co. Booth 38

Type LSRR vibrator for unloading bulk cement from covered hopper railroad cars featured.

Clipper Manufacturing Co. Booth 101

Model HD-50 wet and dry cutting dustless Clipper masonry saw with Adjust-A-Cut control and Save-A-Blade dial, also new model concrete saw.

Columbia Machine Works. Booths 6-7-8

Commercial Shearing & Stamping Co. Booths 77-78

Complete line of cored steel pellets; plastic model of a typical hydraulic circuit in operation, showing a pump, valve and double acting cylinder; representative heavy stampings and forgings will complete the exhibit. Ward Beecher and H. S. Thompson.

Concrete Machinery Co. Booths 30-31-32

Concrete Publishing Corp. Booth 43

Concrete Transport Mixer Co. Booths 89-90-121-122

Hi-Lo truck and transport truck mixer. T. H. Fleming, O. H. Manchester, Jr., P. W. Schreiter, Jr., T. A. Donihee, C. L. Ector, J. A. Kurtz and J. F. Van Way.

Consolidated Boiler Corp. Booths 47-48

Construction Machinery Sales Co. Booths 240-241-242-243

Cook Bros. Equipment Co. Booths 51-52-53-54

New model 5-cu. yd. Challenge mixer mounted on a 3-axle 145-hp. Ford truck equipped with a Cook Bros. dual drive attachment. Roy L. Peck.

Corfor Engineering Co. Booth 200

Exhibit of Corfor precast flooring system.

Erickson Power Lift Trucks, Inc. Booths 134-153

Fork model power lift truck; reverse transmission which can be installed on any of the company's trucks, old or new. Hydraulic fork sideshifter will also be displayed. George Erickson, Jr., A. E. Erickson and W. R. Brodin.

Fleming Manufacturing Co. Booths 87-88-123-124

Complete line of concrete block machinery, including the FMC-180 automatic block machine, the FMC-100 hand-operated block machine, the FMC-12 plant mixer, and drain tile machines. T. H. Fleming, O. H. Manchester, P. W. Schreiter, T. A. Donihee, J. A. Kurtz, J. Van Way and C. Ector.

Forney's, Inc. Booth 46

Compression testing machine for block. R. H. Forney, W. C. Reid and L. L. Wetzel.

Gardner Machine Co. Booth 8

General Engines Co. Booths 147-148-149

Precast fireplace made with precision molds; vibrating table for casting lintels, fence posts, etc.; flagstone molds, and block machine for casting simulated specialty block. Also displayed will be a no pallet block machine, vibrating pallet machines, brick machine, and a number of used machines of the Used Equipment department of the company. F. W. Flowers, R. W. Sutphen, P. R. West and T. C. Tor.

F. C. George Machine Co. Booths 63-64

Presspac hydraulic semi-automatic 2-block machine, with a capacity of more than 400 block per hr. W. H. George.

The Heltzel Steel Form and Iron Co. Booths 57-58

Working scale model of a 300-ton combination batching plant having three aggregate and one cement compartments. C. J. Heltzel, R. E. Heltzel, R. C. Perrett, H. C. Wetzel and Wm. Gilronan.

Jaeger Machine Co. Booths 55-56-79-80

Kent Machine Co. Booths 49-50-85-86

Four machines will be on display: new Volu-Mixer continuous mixer with 36-in. diameter trough, Block-maker, with a capacity of 5-6 block per min., Super Lintelator which makes large size lintels up to 10 ft. 8 in. in length, and the 410 feeder for handling sand, crushed stone aggregate, etc. from hopper or gondola cars. Daniel Urban.

Klingelhoefer Machine Tool Co. Booths 163-164

The Knickerbocker Co. Booth 7

Koehring Co. Booths 128-129-130

Lith-I-Bar Co. Booths 93-94-95-96-115-116-117-118

Mason's Twig Sales Co. Booth 37

Master Builders Co. Booths 131-132-133

Cement dispersing agents for concrete and mortar; air-entraining admixtures for concrete; sparkproof, static disseminating concrete floor finishes; non-shrink mortars; masonry waterproofing materials and non-shrink grouts for the setting of heavy machinery. E. L. McFalls, B. R. Wood, R. R. Kaufman, V. S. Andrews, R. T. Peck, H. L. Andrews and A. Seylor.

Maxon Construction Co., Dumptrete Div. Booths 20-21

Scale working models of the Dumptrete mounted on truck chassis; 15-min. color movie of the bodies in action. Bill Kingman, Fred Stock, Jack Hardcastle and George White.

Medusa Portland Cement Co. Booth 158

Leslie C. Miller Supply Co. Booths 51-52-53-54-81-82-83-84

Multiplex Machinery Corp. Booths 135-136-137-150-151-152

Sam Mulkey Co. Booth 155

Gene Olsen Corp. Booths 141-142-143

Line of GoCorp concrete block ma-

(Continued on page 202)



Group visiting plant at Hart Concrete Products Co., Tampa, Fla., while attending southeastern regional meeting of National Concrete Masonry Association

Southeastern Regional Meeting of N.C.M.A.

Tampa, Florida, meeting drew large attendance to consider new markets, merchandising and plant production

FOR THE FIFTH TIME the Southeastern members of the National Concrete Masonry Association have held a regional meeting. This year the meeting was held at the Tampa Terrace Hotel, Tampa, Florida, on November 12, 13, and 14. The growing popularity of these meetings was evidenced by the fact that some 240 were registered, of whom 73 were ladies. The Florida members of the association who were the hosts comprise 18 companies as follows:

Hart Concrete Products Co., Tampa Sand & Material Co., I. W. Phillips & Co., Tampa; Aquatite Tile Co., Bradenton; Pinellas Lumber Co., Clearwater; King Concrete Products Co., Jacksonville; Naples Supply Co., Naples; Cummer Lime & Manufacturing Co., Ocala; Kissam Builders Supply Co., Orlando; Dunbrick Co., Pinellas Lumber Co., St. Petersburg; Rinker Materials Co., West Palm Beach; Gillis Block & Material Co., Fort Lauderdale; Acme Concrete Corporation, Inc., Alfred Destin Co., Maule Industries, Ramsey Bros., Tops-All Tile Co., Miami area.

Registrations included many concrete block producers whose opera-

tions were outside the southeastern region. Denver, Colo.; Baltimore, Md.; New Jersey, and Illinois producers were represented, and several machinery representatives were also in attendance.

Field Trips

One of the highlights of the convention, and a feature that seemed to make a deep and lasting impression was the bus trips to the plants of the Hart Concrete Products Co. and the Tampa Sand & Material Co. in Tampa, and the plant of the Pinellas Lumber Co. in St. Petersburg. The first and last mentioned plants were described in the May and July, 1948, issues of *ROCK PRODUCTS*.

At these plants the visitors were treated to refreshments and were guests of the producer company under the personal direction of J. L. Hart, president of the Hart Concrete Products Co., and W. H. Warner, who is acting secretary for the Southeastern group. At the Pinellas Lumber Co., Glenn Loughridge and E. S. Kilgore did the honors, and at the plant of the Tampa Sand & Material Co., Frank Brice, plant manager, was host.

The bus trips also included a rather complete survey of the Tampa-St. Petersburg areas and the guests had an opportunity to see for themselves the literally thousands of homes, apartments, and industrial buildings being built of concrete masonry units and in designs and types that rank among the best in architectural beauty and serviceability. At one of the meetings it developed that 94 percent of all construction in the Miami area was of concrete block and evidently the Tampa-St. Petersburg construction practice could show as high, or a higher figure. This speaks well for the quality of the concrete block made in the area, and of the excellent salesmanship displayed by the Southeastern group. Concrete roofing tile, slump concrete block, or the so-called "Arizona Adobe," and colored block played an important part in the general construction program as viewed by the visitors on these well-planned and worthwhile trips.

Secretary's Report

The first day was devoted to registrations and getting acquainted. At the initial business meeting held on



M. E. Rinker, Doug Williams, James L. Hart, Ray Darden, A. E. Lloyd, William Oliver, and George W. Katterjohn



Left to right: Earl I. Martin, Florida Portland Cement Div., General Portland Cement Co.; Carroll Strohm, Nashville Brecko Block & Tile Co., and Hardy Magrath, Lehigh Portland Cement Co.



Left to right: M. E. Rinker, George W. Katterjohn, Frank Brice, and F. Paul Anderson



Jim Hestle, J. H. McDonald, Millard Warren, Charles Crawford, and Shelbourne Warren

Monday, George W. Katterjohn presided. After a brief welcome by a member of the staff of Mayor Curtis Hixon of Tampa, E. W. Dienhart, executive secretary, National Concrete Masonry Association, spoke on the "Highlights of NCMA." Mr. Dienhart briefly outlined the history of trade associations and the cooperative job they are doing in combatting various threats to the industry. Some of these threats are legislative in scope, while others include high winds in the southeast that had practically put some producers out of business, and earthquakes in the Pacific Coast areas that had curtailed operations of concrete masonry manufacturers. Through the combined efforts of the NCMA and local producers the industry has been returned to normalcy. Mr. Dienhart spoke of the work NCMA has been doing in the matter of partitions for veterans hospitals of concrete masonry units. He said that floors and wall partitions could be developed into a very large market for block, citing the new medical building at the University of Washington in the northwest where a half million units went into the floors alone and another half million went into wall partitions. He pointed out that the concrete masonry industry is a large one and is a national asset. A part of his talk revolved about the necessity of selling concrete masonry and he indicated that the general theme at the Cleveland national meeting to be held the latter part of January, 1951, (the 22nd to 25th) will treat this important phase of the industry.

Advertising

Following Mr. Dienhart's report, R. E. McCarthy, Griffith-McCarthy, Inc. advertising executive, gave a talk themed on "Who's Your Competitor?" He discussed advertising of concrete products in general and pointed out that the competitor is not the block plant down the street but the manufacturer of other types of building material. He urged advertising now while business is booming in the concrete block field rather than wait until later on. The selling of concrete masonry is a "We" job, he said.

Mr. McCarthy gave several examples of newspaper advertising that were planned so the reader would be impressed with the advantages of concrete masonry. He said he thought that good ads on trucksides are a good way of getting the manufacturers' message to the public.

George J. Votaw, architect of West Palm Beach chose as his subject, "Three Rules for Success," the three being welded into one, namely, "Get the Business." He gave his hearers a straight-from-the-shoulder talk on what the concrete masonry industry looks like from the architect's point of view, and his first admonition was not to send a boy to do a man's job. Here he was talking about salesmen. He said a concrete sales-

man should "know his stuff." He should present a brief and direct introduction and when his story was told, to leave and not impose on the buyer's time. "Over-selling" and "over-talking," he said, "are a weakness." Before calling on the architect, the product should first be approved by the local building authorities, he emphasized. "Don't call until it is" was his hint. The speaker considered a list of the jobs where the product was to be used to be a powerful sales factor, and that the salesman should be equipped with catalogues showing weights, sizes, delivery time, and list prices. A "call-back" in 30 days was suggested.

Potential Markets

In Miami, Fla., 94 percent of the homes and apartments being built are of concrete masonry, while 6 percent use brick, the speaker declared. In 1936, the percentages were reversed. He said that the resistance architects are subjected to by their clients stemmed from a few bad construction jobs, and bad block scattered about a plant or a construction site seen by other prospective builders had created a bad impression. He suggested some relatively new uses for concrete masonry units, mentioning roofing tile in colors, heating ducts, and French drains as possible large future markets for hollow concrete block. He described French drains as being a system adaptable to drain tennis courts, football grounds or similar athletic fields. They serve, he said, to first drain the rain water quickly, after which hot air can be forced through the tile so as to quickly dry the fields. He felt that by 1960 some 60 percent of the precast concrete business will be prestressed because of the greater strengths possible. There were to his knowledge at least 27 companies now formed or being formed in this country that would produce prestressed structural units. He said there were 21,000 architects in the United States.

Sales Hints

The closing speaker for the day was Dr. Frank Goodwin, professor of marketing, sales psychology and merchandising, University of Florida. Dr. Goodwin spoke on "Little Things That Count." Of these little things, he pointed out, human relations are the most important and he illustrated this by pointing out that in all forms of business, and especially in retail merchandising, where money is spent for such items as advertising, window displays, counter arrangements, etc., the final sales closings are via the salesmen, (or sales ladies).

If these do not function properly, all the money, time, and care previously expended on getting the customer into the store is wasted. Dr. Goodwin drove home his points by several humorous stories that were pithy and fitted well into his general subject.



Left to right are Don Bush, George Oswald, S. J. Picore, and John Bush



E. E. Bratton (left) chatting with J. G. Marbury



Left to right are Glenn Barnes, James L. Hart and M. E. Rinker



Left to right: John M. Bailey, Mrs. John Bailey, Mrs. Sam Bailey, Sam Bailey



Joseph M. Ripley (left) and George L. Rosborough, Jr.



Mr. and Mrs. S. Paturzo of V. Paturzo Bro. & Son, Baltimore, Md.



Mr. and Mrs. E. S. Kilgore, Pinellas Lumber Co., St. Petersburg, Fla.



Mr. and Mrs. C. I. Needham, Aquatite Tile Co., Bradenton, Fla.

He said there is no general formula that could be used as a guide in dealing with human relations, but that good personal appearance of the salesmen is important and the ability to call a man by his correct name is a decided sales advantage. He deplored the use of unsightly trucks used for hauling by the concrete masonry industry.

P.C.A. Promotion

The second day's meeting was presided over by M. E. Rinker and the first speaker was S. H. Westby, assistant manager, housing and concrete products bureau of the Portland Cement Association. Mr. Westby discussed the P.C.A.'s "Sales Promotion Plan" pointing out that unless a producer happened to be near a military establishment he has to depend on local types of construction to carry him through. The speaker told of the advertising program being carried out by P.C.A. which embraced use of 14 national magazines of the popular types. These magazines being used have a circulation of 16½ million copies with a readership of close to 50 million. In Hillsborough County, of which Tampa is a part, these 14 magazines have 16,842 readers. He thought that local advertising ought to tie in with the national advertising and also said that a "Demonstration Home" with an informed attendant was a good selling factor. Mr. Westby said P.C.A.'s plans for 1951 emanated from a hint received from the San Xavier Sand and Gravel Co., Tucson, Ariz., and explained that the Arizona concern used the Guy Lombardo show to make "spot" announcements calling the hearer's attention to advertisements that appear in the national magazines used by P.C.A. The plan now is to send advance proofs to local concerns interested in the production of concrete masonry so that these producers can follow up along the pattern set by the San Xavier Sand and Gravel Co.

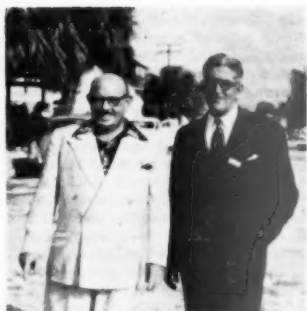
Because of the absence of two scheduled speakers, a sound movie in color showing the use of concrete block in various construction fields was presented. This excellent picture was supplied by the Portland Cement Association.

Question-Answer Session

Next on this program was the "Open Forum" with seven qualified men at the speaker's desk to answer any questions from the floor. These experts were:

Carroll Strohm, director, N.C.M.A., Nashville, Tenn.; Glenn Barnes, president, N.C.M.A., Syracuse, N. Y.; Harry McDonald, P.C.A. representative; Turner Scott, Signal Mountain Portland Cement Division, General Portland Cement Co.; Harry Mitchell, P.C.A. representative; Frank Brice, plant manager, Tampa Sand & Material Co., Tampa, Fla., and James

(Continued on page 199)



F. Paul Anderson (left) general superintendent, Maule Industries, Miami, Fla., and C. B. King, president, Maule Industries



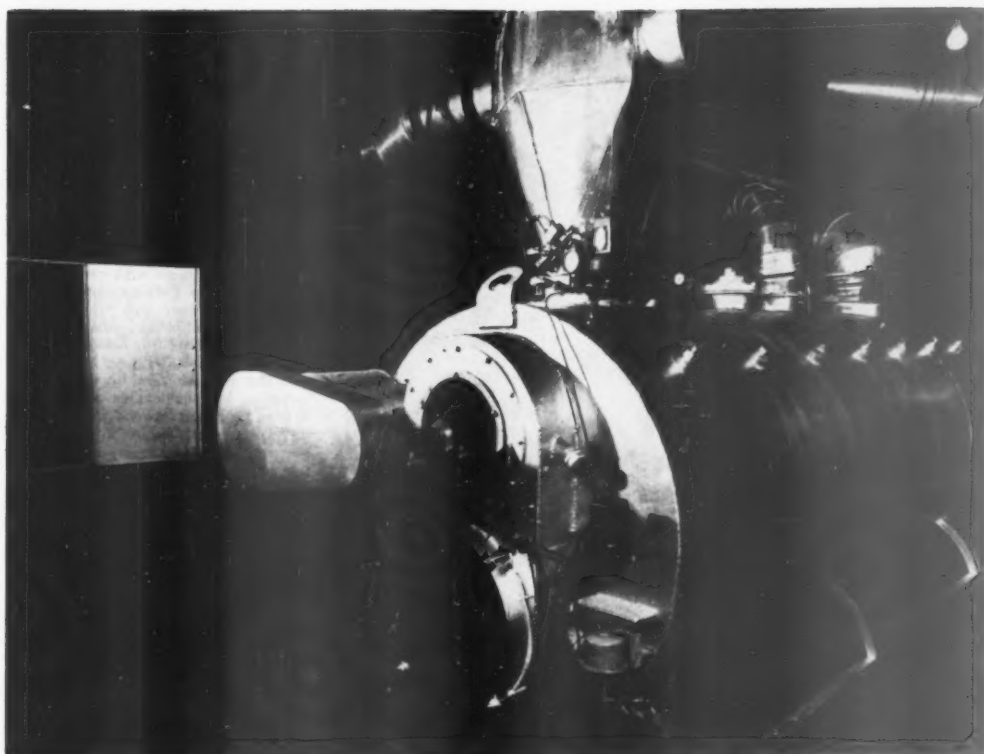
Mr. and Mrs. George E. Nagle. Mr. Nagle is vice-president and general manager of Perma-concrete Products Corp., Columbus, Ohio



E. W. Dienhart, left, executive secretary, N.C.M.A., and Edmund Brooke



Mr. and Mrs. John D. Carney, Denver, Colo.



Direct-firing curing unit to supply steam for from one to six kilns through ducts (above left). Unit is oil-fired and is effective in delivering large volume of steam quickly at high temperature and low pressure into kiln without turbulence

Steam Curing With Direct Firing Unit

New process at plant of Barnes & Cone, Inc., permits cyclical application of steam for maximum takeup of moisture in units; improved quality and uniformity of product result

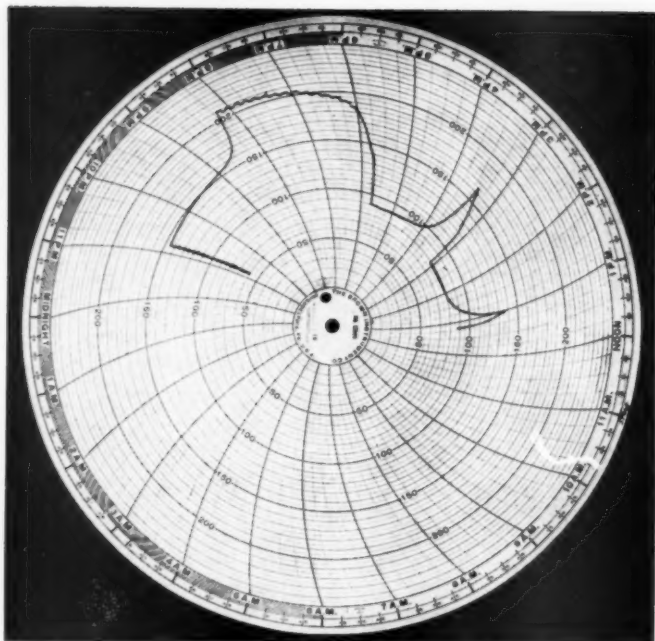
A PROCESS OF STEAM CURING concrete masonry units, absolutely new to the industry, has been developed at the Syracuse, N. Y., plant of Barnes & Cone, Inc., and results from a year of actual plant experience indicate greatly improved performance when compared to other methods of high temperature curing in low-pressure kilns. The key to the system is a direct-firing heating unit developed specifically to supply steam for curing, which enables extremely rapid generation of steam so that maximum moisture and high heat can be applied simultaneously, in great volume, to concrete units in the form of low pressure steam. Through automatic controls, heat is applied through release of steam into a kiln at regulated

By BROR NORDBERG

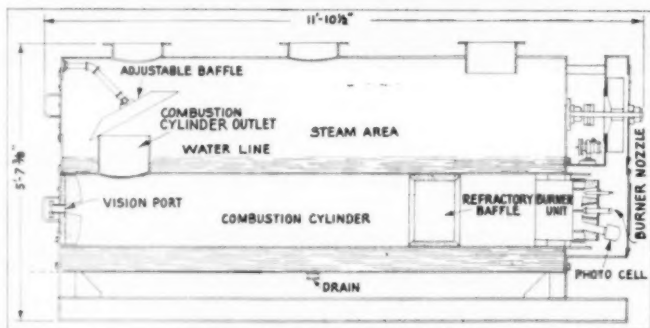
time intervals in a pre-determined cycle for maximum takeup of moisture by the concrete units throughout the curing period. This principle of moisture-heat application starting immediately after a kiln is filled and closed, and without any waiting period, was determined by test, to effect optimum conditions for complete hydration of the cement, and apparently is accomplishing the objective. The steam is "fluffed" into the kiln in great volume at low pressure to minimize turbulence and thereby envelop each unit uniformly.

Uniformity of quality was the prin-

cipal objective of the company when it first undertook a planned study of curing methods five years ago, in recognition of the fact that uncontrolled conditions reflect in non-uniform products. Research has been conducted in collaboration with R. D. Emmons, combustion engineer of Syracuse, whose most recent development, the "Vapor Therm" system of automatic controlled firing and heat transfer, discussed herein, culminates a series of developments which have all added to progress toward improved quality, increased efficiency and lowered costs. The great interest of the company in the attainment of improved curing methods stimulated the research program of Mr. Emmons and provided the means for study under actual



A typical graph recording temperatures throughout cycle in curing kiln



Vertical section of direct-firing curing unit



Loading cube of concrete masonry units on new type dumping truck to facilitate handling

plant conditions, which will be continued, since the system now in use, according to Mr. Emmons, has not yet been adequately tested for development of optimum performance and conclusive test data.

Results attained thus far, after one full year of operation with the direct-firing unit, have reflected in better quality, greatly reduced curing costs and accelerated turnover with reduction in the amount of stockpiling required. Some 60 percent of the total curing cost has been saved when compared to operations with conventional boilers, due to fuel savings and because no engineer and tubing or refractory maintenance are required. High early strength is attained, in the neighborhood of 700 p.s.i. after 8 hr., and the reduction in breakage from handling is considerable as a result. It is in the neighborhood of 25 percent as compared with units cured by earlier methods. Compressive strengths in the 1200-1400 p.s.i. range are attainable in one day when the wet-curing cycle is supplemented by a drying period using steam rather than heated air. Units are uniform in strength, have an improved light color and a ring that denotes soundness as they come from the kiln.

Direct-Firing Unit

The direct-firing unit is similar in appearance to a horizontal marine-type boiler. It consists essentially of a 1-ft. 6-in. diameter fire tube 10 ft. in length which is housed within the lower part of a 3-ft. 8-in. diameter stainless steel shell. When in operation, the fire tube is submerged in water, with the steam chamber just above. The firing tube has a 12-in. outlet opposite from the burner end extending up through and above the water line with the opening into the steam area. Converging on the gas outlet are spray nozzles. Purpose of the sprays from these nozzles is to provide steam for an initial period of 20 to 30 minutes until the water in the shell is heated to 212 deg. F. The unit is oil-fired (gas is optional) and steam is generated within a few minutes after the burner is started.

Temperature and the degree of steam saturation are automatically controlled by recirculating water through stainless steel spray nozzles which direct streams against the flow of gases. As shown in the accompanying sketch, there is a 12-in. diameter stack to the atmosphere and a steam outlet to a chamber from which 12-in. diameter ducts branch to the individual kilns where steam is introduced just below the ceiling at a pressure of 2-2½ oz. and a temperature in the range of 400-600 deg. F. This particular unit, at Syracuse, has been designed to serve six curing kilns, for a 24-hr. capacity of 30,000 units. The standard size of concrete unit at this plant is 8- x 8- x 18-in.

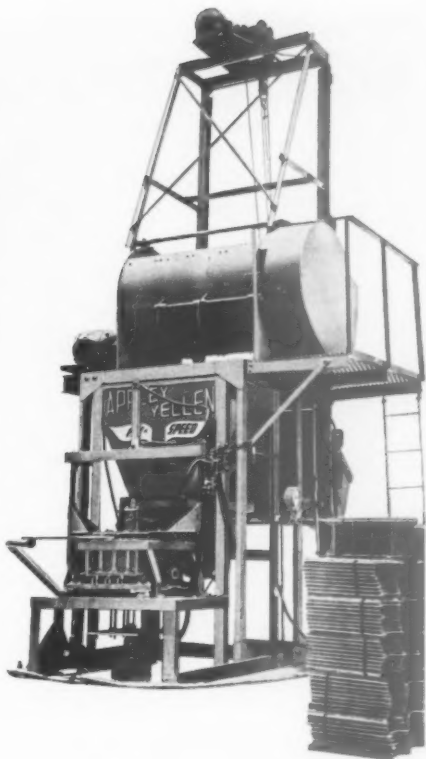
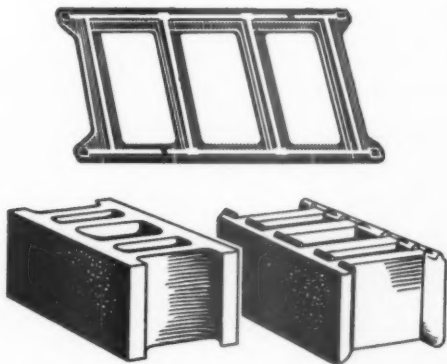
All metal surfaces exposed to steam and water are of stainless steel and

IT'S FAST — IT'S VERSATILE — and the Investment is LOW!

**Mishco's Appley-Yellen
Block Machine Assures
You High Output With
Nominal Investment Cost**

It's Fast: Production of 400-500 blocks per hour (average for 8 hr. day) easily attained. Accurately timed and controlled cycles on automatic operation produce blocks of uniform density and size.

It's Versatile: Using only one core box with quickly interchangeable cores and the new type "R" reversible pallet, the Appley-Yellen Hi-Speed Block Machine can, with ease, produce any type of conventional or mortarless block. The close tolerances demanded by the mortarless block are no problem with this machine.



Low Investment: One machine, one set of pallets for both types of blocks! Made to jigs and fixtures, each machine the same. No high-price, high-pressure hydraulic parts and fittings — uses low (80-100 lb.) air pressure. Can be purchased as a single unit or complete plant with all allied equipment supplied.

Remember These Points

1. High productivity.
2. Very versatile (Conventional and mortarless blocks — all sizes and shapes).
3. Low investment (one machine, one set pallets).
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5. Rugged — designed and constructed for heavy-duty operation.
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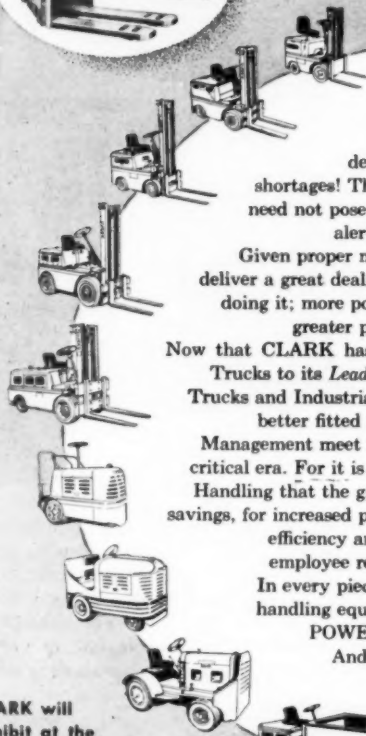
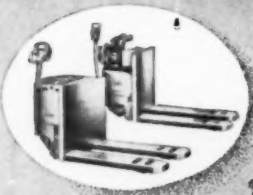
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STEADILY RISING COSTS—growing user demands—imminent labor shortages! These very real conditions need not pose frightening problems to alert and able management. Given proper machines, manpower can deliver a great deal *more power*—and enjoy doing it; more power that translates into greater production at lower cost. Now that CLARK has added Powered Hand Trucks to its *Leadership Line* of Fork Lift Trucks and Industrial Towing Tractors, it is better fitted than ever before to help Management meet the challenges of a most critical era. For it is in the field of Materials Handling that the greatest opportunities for savings, for increased production, for improved efficiency and for the betterment of employee relations are to be found. In every piece of CLARK materials-handling equipment, there is **MORE POWER FOR MANPOWER.** And it is yours to employ—yours to enjoy.



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R. D. Emmons, combustion engineer, is the inventor of a new curing unit

the accessory piping and exposed auxiliaries are of copper alloys to protect against corrosion and oxidation. The burner is 20 percent clad, which is a chrome stainless steel stabilized by chromium nickel to prevent oxidizing the carbon from the metal.

With this steam generating unit, the low pressure steam displaces air in the kiln, which escapes through an outlet at floor level through a stack. No fan to exhaust air is required. The stack opening is in use for one minute when the unit is started to exhaust the initial puff of gases to the atmosphere. It then automatically cuts out and all products of combustion are then automatically introduced into the kiln together with the steam.

At this plant, the unit is set up ultimately to supply the requirements of six kilns through automatic timing control in dovetailing the separate curing cycles, and presently is supplying two kilns. A second unit is planned to serve a second bank of four kilns.

Curing Cycle

As stated earlier, the objective is to accelerate curing through providing the optimum conditions for complete hydration of the cement which requires providing adequate moisture during the entire curing time range. No waiting time period is provided for before introduction of steam because it is believed desirable to add moisture immediately after the units are fabricated rather than permit loss of moisture. Accordingly, the kiln doors are closed immediately after the rooms are filled, and steam is applied without delay. The direct-firing unit makes steam available at 400-450 deg. F. within 3 to 4 minutes after the oil burner is started.

Degree of heat application and the timing of heat application are governed according to suspended weight tests that are conducted in the kilns in order to measure moisture take-up. For one of the 20- x 40-ft. kilns holding 35 racks with 72 units on each (2520 block), the cycle is as follows. After the kiln doors are closed, the burner is started and operates from 10 to 12 minutes to raise the indi-



Curing of concrete masonry units is done under covered storage

cated kiln temperature to 135-140 deg. F. as measured by Brown instrument and recorded on the chart. Steam is then automatically cut off. At that temperature, suspended weight tests with three units on a pallet have indicated maximum moisture absorption, and that there would be no point to continue the application of steam. Approximately 9 oz. of water have been taken up at that stage by the pallet and three units.

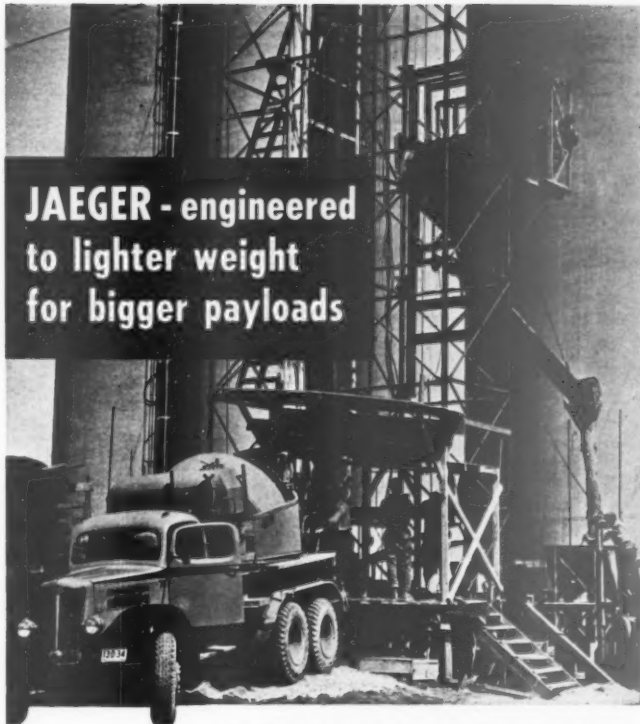
In one hr., the temperature in the kiln has dropped to approximately 110 deg. F., and the heating unit is automatically started to bring the indicated kiln temperature up to the 160 deg. F. range in about 30 minutes when the automatic cut-off is repeated. Moisture takeup during this period is 10-12 oz. After about one and one-quarter hr. of soaking, the temperature drops to 135 deg. F. and steam is applied to raise the temperature to 203-205 deg. F. in approximately 40 minutes. That level is held for nearly an hr. when the steam is automatically cut off to complete the application of steam for the entire cycle, amounting to 6000 lb. of steam total. Gain in weight is then nearly $2\frac{1}{4}$ lb., each unit weighing about $\frac{3}{4}$ lb. more than it did when taken from the block machine. In the more conventional methods, with a waiting period before steam application, there is an actual loss in weight of 6 oz. per unit within the first three hours.

After eight hours total time, including three hours after shut-off of the steam, sufficient strength of about 700 p.s.i. is obtained for handling with a minimum of breakage.

When curing units simultaneously in multiple kilns, the curing units will be set up to provide automatic control through master controls providing individual time cycles in any selected sequence.

Performance

As a device for the generation of steam, the direct firing unit is an efficient apparatus. Fuel efficiency is 95 percent. According to meter measurement of the water input, 120,000 of



6000 YARDS IN 168½ HOURS: Jaeger 3 yd. HI-DUMP truck mixers (6 by day on a 5-mile haul, 10 each night on 8-mile haul) made this continuous pour without a hitch on 1,200,000 bushel bin addition to grain terminal near Canal Winchester, Ohio.

Latest payload-producing Jaeger HI-DUMPS weigh 600 to 1600 lbs. lighter. Yet, because they're engineered (not stripped) for weight-saving, they are more rugged, require 50% less maintenance than former models. No change in heavy gauge of drums and blades—but revolutionary improvements as well as weight-savings in Jaeger's latest 2-speed "unit" transmission, "spider" drum drive and self-aligning hopper with self-lubricating, leak-proof seal.

Faster, too—10 seconds per yard to end-load dry materials with new hopper and 24 rpm drum "charging" speed, distribute batch water at rate of 100 gpm, and discharge a yard of 4" slump concrete in 20-25 seconds, 1" slump in 60 seconds.

2-3-4½-5½ YD. SIZES
End-Loader or "Sealed Drum"
Top Loader Types. Fluid drive
(if you want it). Truck engine
drive if desired.

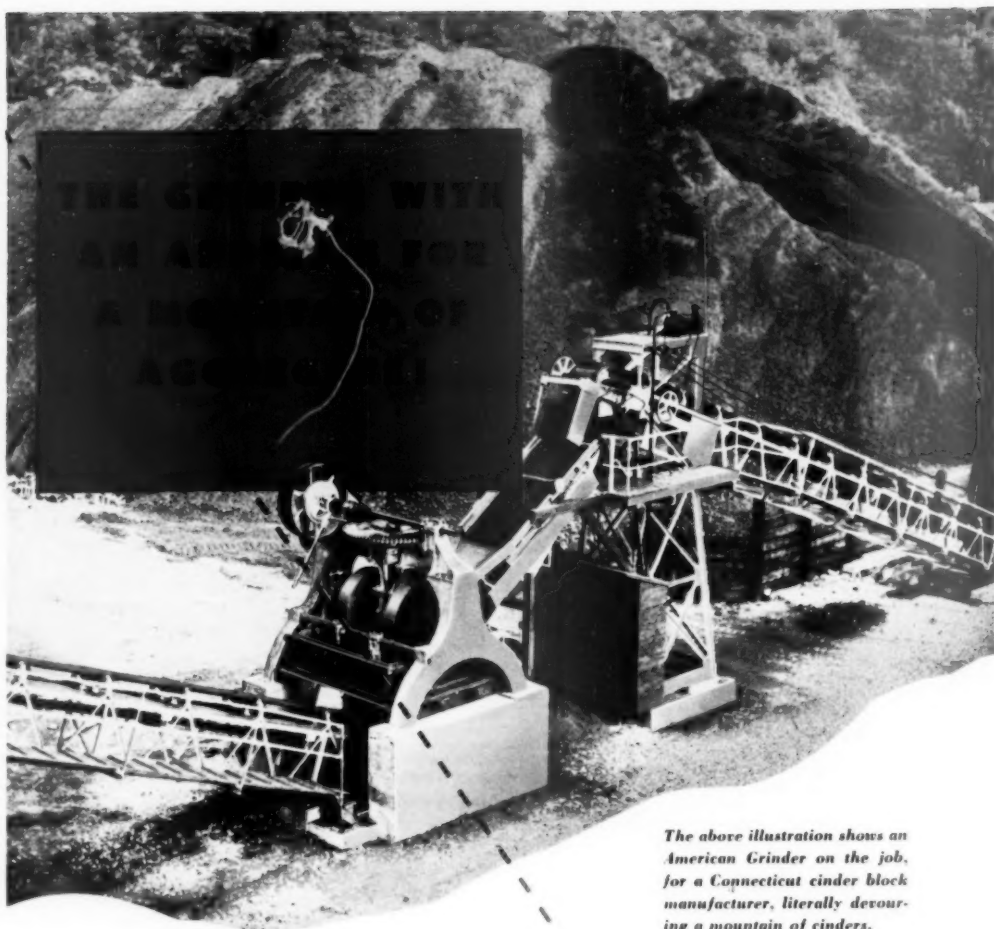
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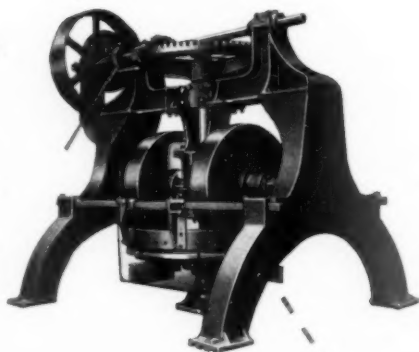


The above illustration shows an American Grinder on the job, for a Connecticut cinder block manufacturer, literally devouring a mountain of cinders.

Want big-volume aggregate production?
 . . . then get all the facts about the
 "American" Grinder that lives on a steady diet
 of a mountain of aggregate . . . and does
 the job right . . . for perfect block pro-
 duction, with minimum maintenance cost.
 Cinders, Pumice, Slag, Burned Clay and Shale,
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Select from 8 sizes to meet your production needs.

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Left to right are Arthur Goodell, sales manager, Glenn Barnes, president, and plant manager Harold Pratt

the 138,000 B.t.u. per gal. of No. 2 domestic fuel oil is effective in generating steam put into the kiln. The only heat loss is in products of combustion. Approximately 44 gal. of fuel oil are required for the 5-hr. cycle considered above, in the delivery of 6000 lb. of steam to cure 2520 units, or 130 lb. of steam per gal.

Firing temperature is 2400 deg. F. as measured at the end of the flame, and the outlet temperature into the steam chamber is 1100 deg. F. A considerable portion of the heat of the gases therefore enters the steam chamber where there is very effective direct transfer of heat to the water. Exit gases into the steam chamber contain 10-12 percent CO_2 , burning being controlled so that air is held to a minimum.

Application of steam in cycles, for maximum takeup of water, permits a reasonable rate of heat increase in the units which is believed to contribute to the fact that the units are not brittle and prone to break in handling. There is no sign of hairline cracking of the units which would suggest sur-

face tension and brittleness. Lack of turbulence in the kiln as the steam is introduced creates uniform conditions throughout the kiln, reflecting in product uniformity. Entrance of CO_2 first into the kiln, with water absorption, creates a slight static pressure forcing air out of the duct at the bottom and steam descends to the floor level within five minutes after start of the curing cycle.

It is believed that the CO_2 admitted into the kiln with the exit gases may possibly contribute to the hardening of the units but that opinion has not been substantiated by actual proof.

Drying following wet curing is not regularly practiced but, when desired, is done by high temperature saturated steam rather than by heated air because of the greater economy. Steam, having a greater density than air, is a more effective medium for transfer of moisture out of the units which, when the units are heated above 212 deg. F., flashes out of the units in the gaseous state. The drying process would start 12 hr. after the units are made and it is no trick at all to re-



Curing and truck loading is done in paved area in covered storage

"BRANFORD" Vibrators

Branford's Pneumatic Big 3 Offer Step-by-Step Savings For Concrete Products Plants



"BRANFORD" Car Shakeout Vibrator
Low cost portable shakeout that effectively unloads cement and other bulk materials from Covered Hopper-bottom Railroad Cars.



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Eliminate destructive poking and slogging, assure instant flow from storage bins and feeder hoppers.



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Produces denser — smoother finished products. Quickly and easily moved about as required. Ideal for concrete pipe, burial vault, septic tank, or building forms.

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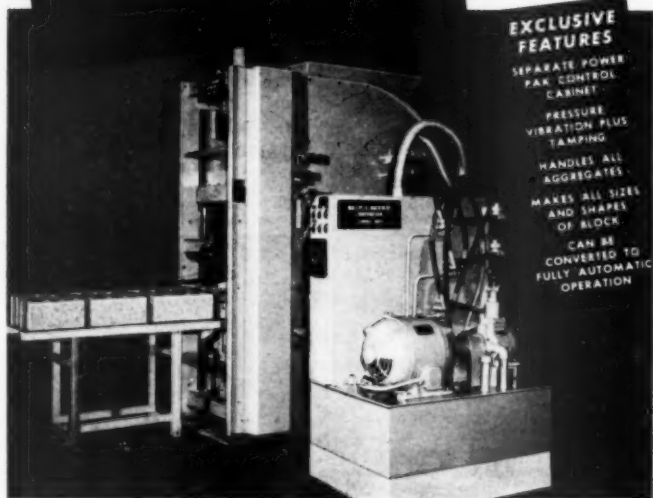
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Vibrator Company



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MULTICO'S NEW LITTLE BEAVER BLOCK MACHINE



**EXCLUSIVE
FEATURES**
SEPARATE POWER
PAK CONTROL
CABINET
PRESSURE
VIBRATION PLUS
TAMPING
HANDLES ALL
AGGREGATES
MAKES ALL SIZES
AND SHAPES
OF BLOCK
CAN BE
CONVERTED TO
FULLY AUTOMATIC
OPERATION

SEMI-AUTOMATIC • HYDRAULICALLY POWERED LOW INITIAL COST FOR SMALL PLANT OPERATORS

Another Multico first — this new sensational LITTLE BEAVER block machine can get you started in the concrete block business with minimum initial costs. Designed particularly for the small plant operator, the LITTLE BEAVER offers Blockmaster high production, quality block output, at the same lower labor costs.

It is semi-automatic — can be inexpensively converted to be fully automatic at a later date. Manual controls located conveniently on the separate power pak, first release the aggregate — vibrate on pressure — then tamp the block to size, all in one simple cycle of operation.

The LITTLE BEAVER'S advanced design represents the know-how and experience acquired through Multico's 45 years in this industry. The machine uses plain steel pallets, enabling you to produce any size or type of block desired.

Have a Multico Field Engineer assist you in planning your plant now — let him tell you first hand how you, too, can have a profitable operation right from the start with the LITTLE BEAVER.

MULTIPLEX MACHINERY CORP.

ELMORE
OHIO

MANUFACTURERS OF BLOCK MACHINES • MIXERS • SHIP HOISTS • STRIPPERS • ELEVATORS

move moisture contained in the units in excess of 25 percent or even less total absorption.

Kilns—Layout

Block are manufactured of Celconcrete, hard anthracite cinders or sand and gravel aggregates. The same curing cycle is used for units made of either aggregate and with no difference in performance and the results with respect to quality. Use of air-entraining cement is standard practice.

The plant has two Besser Super Vibrapacs and currently is manufacturing 24,000 units per day on two 10-hr. shifts. Layout is an L-shape with a 40- x 85-ft. undercover area of concrete for cubing and loading block and for considerable of the yard storage. Kiln capacity is 22,000 block total at the present time. Kilns consist of a 20- x 60-ft. unit holding 3960 units on 55 racks, and the balance (10 total) hold 2520 and 1584 units each respectively. They are not insulated but are equipped with tight-fitting aluminum doors. Construction is of 12-in. outside walls and 8-in. partition walls of cinder block with 12-in. ceilings consisting of T-beams with 8-in. cinder concrete filler units and topped with 4 in. of lightweight concrete. Handling into the kilns, to the cubing area and loading on to trucks is done with Hyster and Towmotor lift trucks. An overhead crane is also used for handling cubes.

Glenn Barnes, president of Barnes & Cone, Inc., who is widely known throughout the industry as president of the National Concrete Masonry Association, has been tremendously interested in improving methods of curing for many years and his continued interest and willingness to undertake the development of new methods is credited with stimulating the research by Mr. Emmons that led to this newest technique of curing. Harold V. Pratt is plant manager, Arthur Goodell is sales manager, and Lary Carter is office manager. The company also operates the Albany Block and Supply Co., Inc., at Albany, N. Y., and Auburn Cement Products, Inc., Auburn, N. Y.

Masonry Association Meeting

CONCRETE MASONRY MANUFACTURERS ASSOCIATION held its general membership meeting November 9 at the Rodger Young Auditorium, Los Angeles, Calif. Guest speaker at the meeting was Charles A. McKeand of the Merchants and Manufacturers Association who spoke on the subject, "Supervisors Tool Kit." Other features of the program included the election of officers and directors for 1951; report from the safety committee and a report from Sam Hobbs of the local Portland Cement Association office on the new uniform plumbing code, pertaining to cesspools.

Florida Convention

(Continued from page 190)

Hart, President, Hart Concrete Products Co., Tampa, Fla.

Questions submitted to the convention were prepared from a questionnaire previously given the group. Some of the questions were so broad that answering them was a difficult problem. Questions were asked such as, "Is there any practice that is standard or best?" The answer was "No"—"A controversial subject," etc. "What is the best steam pressure to



Mr. and Mrs. C. D. Fellebeum

use when cost and operating features are considered?" was another broad question that could be answered many ways. It appeared that no particular pressure is needed—only get the steam into the room and raise the temperature to the desired point.

One question relating to the best method of getting steam to discharge into a steam room was answered by pointing out that if the incoming steam line was kept close to the floor, and a few inches back from the edge of the kiln, orifices spaced on about 2-ft. centers would permit steam to impinge against the wall of the kiln and to rise upwards. Nozzles are not needed and tests have shown greater strengths in block cured in areas closer to the direct action of steam. This was exemplified by stronger block in the lower part of the racks where the steam was admitted under the rack. Radiators are not needed, generally, in areas south of the Kentucky-Tennessee line.

Because of the large number of questions asked, and because of our space limitations, this report will omit the questions, and only the answers are given by the experts and will indicate their tenor.

Concave roof construction for kilns was considered best and a kiln should hold only one hour of plant production; a good width for a kiln was 12 ft.; time and temperature in kilns for different kinds of aggregate was a subject that could be best approached by the individual producer and could be gauged somewhat by the operating schedules; high temperatures might give a cooking action and could result in a white block exterior that would slough off, particularly if the alkali content of the cement was high.

President of NCMA, Glenn Barnes,

Towmotor MH*

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*MH IS MASS HANDLING—the systematic movement of the most units, in the shortest time, at the lowest cost.

Valuable,
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difficult or even impossible to reach by outmoded manual handling, becomes easily accessible with a Towmotor Fork Lift Truck. In lifting and stacking heavy loads right up under the rafters, Towmotor Mass Handling can double the amount of storage space without increasing the floor area!



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speed order filling, eliminate dangerous and costly "stock-falls." Select from 12 models plus standard and specially designed accessories for handling loads from 1500 to 15,000 lbs.—a Towmotor for every job. And learn how skilled Towmotor Preventive Maintenance keeps your equipment on the job—mail coupon below. Representatives in all Principal Cities in U. S. and Canada.

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GEAR CASE**

UNIT 614— $\frac{1}{2}$ Yd.
25 years of engineering skill and craftsmanship have gone into the production of this outstanding model. It offers the same rugged construction usually found only in machines of greater capacity. Compare its construction, features and design with any $\frac{1}{2}$ yard machine in the market today. Get the facts—Write today for literature.

The one-piece cast gear case is an exclusive UNIT feature. It provides a completely rigid enclosure for all gears, shafts, and bearings. All shaft openings are simultaneously bored by a machine designed specifically for this accurate operation. Misalignment is impossible. Every working part in this self-lubricating, main machinery case operates in a constant bath of oil. Flawlessly sealed at every point, it keeps lubricants in — dirt and abrasives out! Split drums and sprockets are mounted on large diameter shafts with short spans between bearings. This reduces deflection to a minimum, and bearing replacement is seldom necessary. It's a precision-made masterpiece of design and engineering — "The Heart of Every UNIT!"



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briefly gave his views on questions relating to time-temperature in kiln operation and these revolved about the time required to bring the block up to a pre-set temperature and to use steam temperatures accordingly. "Regular Curing" is a broad subject, but answers were in the 130 to 205 deg. F. range for this type of curing; use of autoclaves limited production and costs were high, but because there was more money to spend the trend was towards better types of kilns. A Portland Cement Association representative told of comparative tests on high pressure steam curing, these tests showing high pressure block were of better overall quality, with less expansion and contraction characteristics; there have been no new high pressure developments in regard to plant operation during the past 25 years.

President Barnes told of work being done at his plant in the Syracuse, N. Y., area in which high temperature, low-pressure steam was used. He recommended suspended-weight experiments in kiln operation so that studies could be made showing whether a block being cured was absorbing water, or drying out. Advantages and disadvantages of soak periods of varying time lengths could thus be better observed.

He told of one concern in Boston which was experimenting with temperatures as high as 800 deg. F. President Barnes said he had Brown recording pyrometers on all his kilns.

Exhaust fans on a kiln that can help take advantage of the latent heat in the walls and ceiling may be an answer to the moisture problem; A.S.T.M. requirements as regards moisture in a block may be lowered from 40 to 30 percent.

The amount of money to spend on advertising was answered by asking how much can one afford to pay a salesman. Where and how to advertise was given the answer of appealing to the public and in a dignified manner. Radio ads are satisfactory. James Hart said his selling was built around a four-way test: (1) Is it the truth? (2) Is it fair to all? (3) Will it build good will and better friend-

HIGH GRADE PORTLAND CEMENT AVAILABLE!

50,000 tons of tested and approved ALSEN'SCHE brand portland cement, manufactured in Germany, available for prompt and early future shipments from abroad.

350,000 barrels used in the all important Seawater-Construction of the Florida East Coast Railway, Key West Extension, U. S. A.

Send your inquiries stating quantity and delivery requirements.

HARRY DIXON & SONS, Inc.

250 Park Avenue

New York 17, N. Y.

ships? (4) Will it be beneficial to all concerned?

Operating Problems

Cubing of block was discussed by Harry Mitchell who suggested packaging the block so air could more easily circulate around it. Frank Brice said his cubing process was based on a 60-block package as most of his deliveries were on a 200-300 and 500-block basis. Ninety block per package was not recommended. Hand unloading has proven the best method with loading by fork trucks. Turner Scott said that air-entrained concretes had better strength and that this was possible due to more water in such a mix, plus a better lubrication and hence better mixing.

The open forum developed some discussion relating to artificial lightweight aggregate production furnaces both of the rotary and sintering types. Both were costly, it was pointed out.

Carroll Strohm told of his company's bookkeeping methods with emphasis on cost accounting. Manufacture of slump concrete block was briefly described by Mr. Mitchell. This includes richer mix as a main requirement. As to colored concrete, hearers were advised to stick to the natural oxides (reds, yellows, browns, and shades thereof) and to avoid blues.

Causes of concrete masonry units cracking in the wall were discussed by Harry Mitchell, P.C.A. representative. His suggestions for preventing cracking were: (1) Horizontal reinforcing steel to be placed in foundations. (2) 8-in. bearings of lintels not enough: fatigue is a factor. (3) Column action at borders of window and door openings are important. (4) Roof movements cause cracking, and where a wood plate is used, the bolt holes in this should be twice the diameter of the steel bolt so as to permit shifting. (5) Expansion and contraction in long walls should be protected by expansion joints: too strong a mortar in such long walls is harmful and he said a 1-1-9 and/or a 1-2-9 mix was often better than a 1-1-6 mix. (6) Too much substitution in a design. (7) Wall mesh (wires) can be helpful to prevent cracks.

N.C.M.A. Program

President Glenn Barnes closed the meeting with a talk on "Why an NCMA?" He said he had three plants in operation in 1913 and installed steam curing in 1915. He believes in group action and a free exchange of thoughts and engineering data, mentioning that the clay products industry is experimenting with a "clay-block" that might have some advantages and compete with concrete units. He told of the work the NCMA is doing in 67 architectural colleges throughout the nation, mentioning that NCMA was supplying these colleges with drawings, engineering data, slides, etc., so that the students get early training in the many uses

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Incorporating Special Features of ADVANCED DESIGN

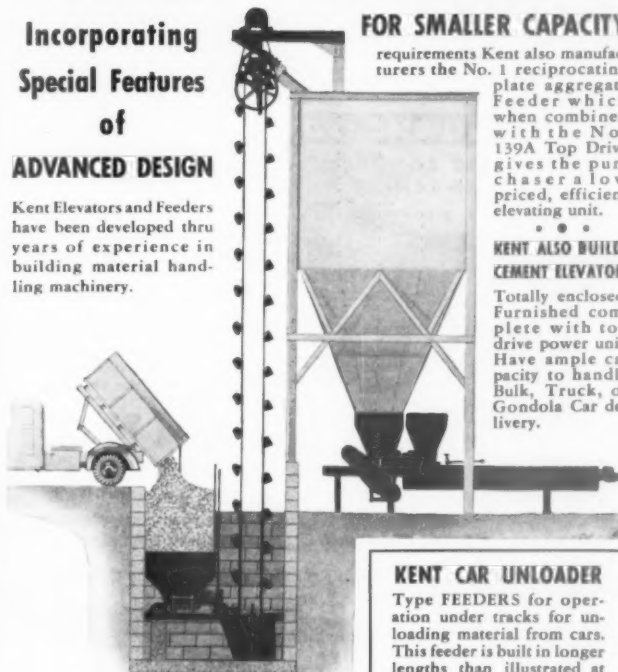
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requirements Kent also manufactures the No. 1 reciprocating plate aggregate Feeder which when combined with the No. 139A Top Drive gives the purchaser a low priced, efficient elevating unit.

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Totally enclosed. Furnished complete with top drive power unit. Have ample capacity to handle Bulk, Truck, or Gondola Car delivery.



KENT CAR UNLOADER

Type FEEDERS for operation under tracks for unloading material from cars. This feeder is built in longer lengths than illustrated at the left.

No. 410

ADVANCED MODEL FEEDER

(Can also be used as Car Unloader)

For handling sand, crushed stone, or lightweight aggregate, etc. from hopper or gondola car.

It is driven steadily and smoothly by the elevator motor through the elevator boot. Material is continuously fed into boot by long-life rubber belt—pressure, grease lubricated anti-friction bearings—rollers support belt at intervals.

Adjustable hopper gate governs volume of material fed into elevator boot.

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KENT MOTORIZED ELEVATOR

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Unit drive is by electric motor through V-belts. Shafts revolve on anti-friction pillow blocks, pressure grease lubricated.

Elevator is easily attached to bin by means of heavy channels at right angles to main members.

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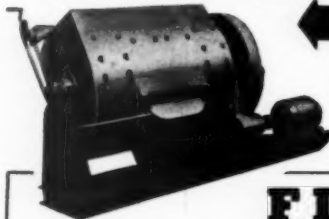
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**AUTOMATIC CONCRETE
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COMPLETE CONCRETE BLOCK PLANT EQUIPMENT

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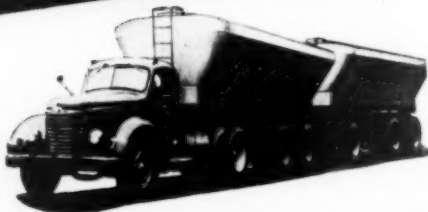
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Delivers a perfect concrete mix to one or more machines.

Priced as a TWO sack Mixer with THREE sack Drum and Gear Reduction Capacity.



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It's Built for the Job !**



Baughman BULK CEMENT TRANSPORT

Designed specifically for cement transport. Low in cost because of modern engineering and production methods. Built of high tensile alloy steel for more strength with less weight, giving **MORE PAYLOAD**. Waterproof manholes spaced for capacity loading. Cat-walk top . . . climbing ladder. Electro welded throughout. Available in 15' to 33' lengths.

Self Unloading . . .

Twin screws give fast action . . . covered with special air cells for easy starting and high speed discharge. Equipped with powerful motor . . . all controls conveniently located on outside of body. Simple . . . positive . . . immediate.

Write for full details on the Baughman Line of transport bodies and conveyors.



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"There is a Baughman Distributor Near You"

offered by concrete masonry units. He said these colleges were turning out 10,000 graduates every four years.

The evenings were marked by a cocktail hour and suitable dinner entertainments. Special functions were provided for the ladies.

Concrete Industry Exhibits

(Continued from page 186)

chinery. E. F. Olsen, G. D. Olsen, R. O. Davis and F. M. Cook. Oswalt Engineering Service Corp. Booth 166

Pit and Quarry. Booth 14
Prashak Machine Co. Booths 39-40-41
New model of Automatic 400 block machine and a 21-cu. ft. batch mixer. H. A. Prashak and G. H. Prashak. The Prime Mover Co. Booth 165
Ransome Machinery Div., Worthington Pump & Machinery Corp. Booths 59-60-75-76



Concrete block testing machine, in Forney's, Inc. booth

Rock Products. Booth 36
Schmidgall Manufacturing Co. Stage Demonstration of No. 333 block fork which handles a 48- x 48-in. cube. Service Caster & Truck Co. Booths 71-72

T. L. Smith Co. Booths 91-92-119-120
Solvay Sales Div., Allied Chemical & Dye Corp. Booth 159

Split-Rock Products Co. Booth 35
Spray-O-Bond Co. Booth 34
Stearns Manufacturing Co. Booths 65-66-67-68-69-70

Supremix, Inc. Booths 144-145
Line of central mixing plant equipment. Melvin Meyers and Robert Miller.

Universal Door Carrier, Inc. Booth 156
Universal Manufacturing Co. Booth 15
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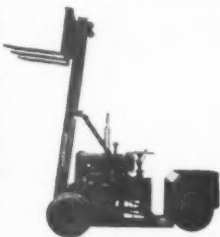
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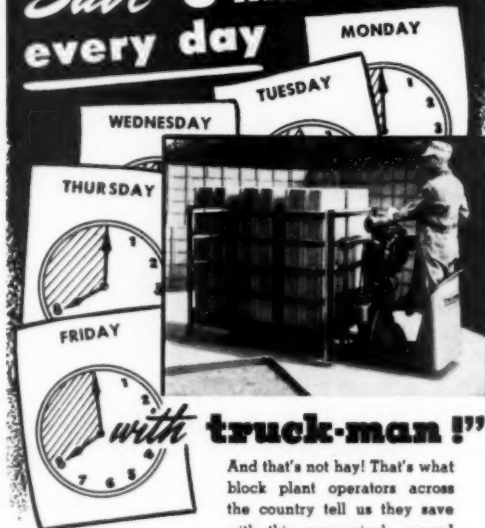
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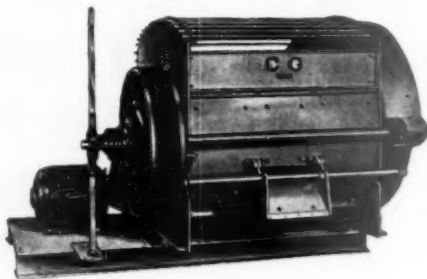
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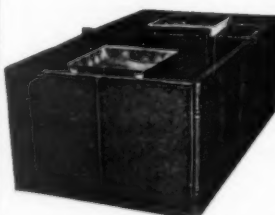
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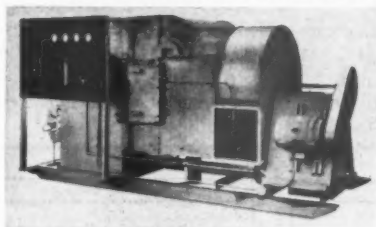
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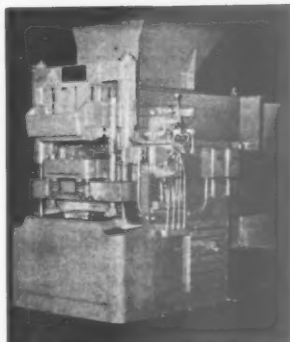
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..... Concrete Building
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..... Molds
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..... Classifiers
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..... Plants
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..... Molds
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..... Conveyors
..... Crushers
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..... Crops
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Chicago 6, Illinois

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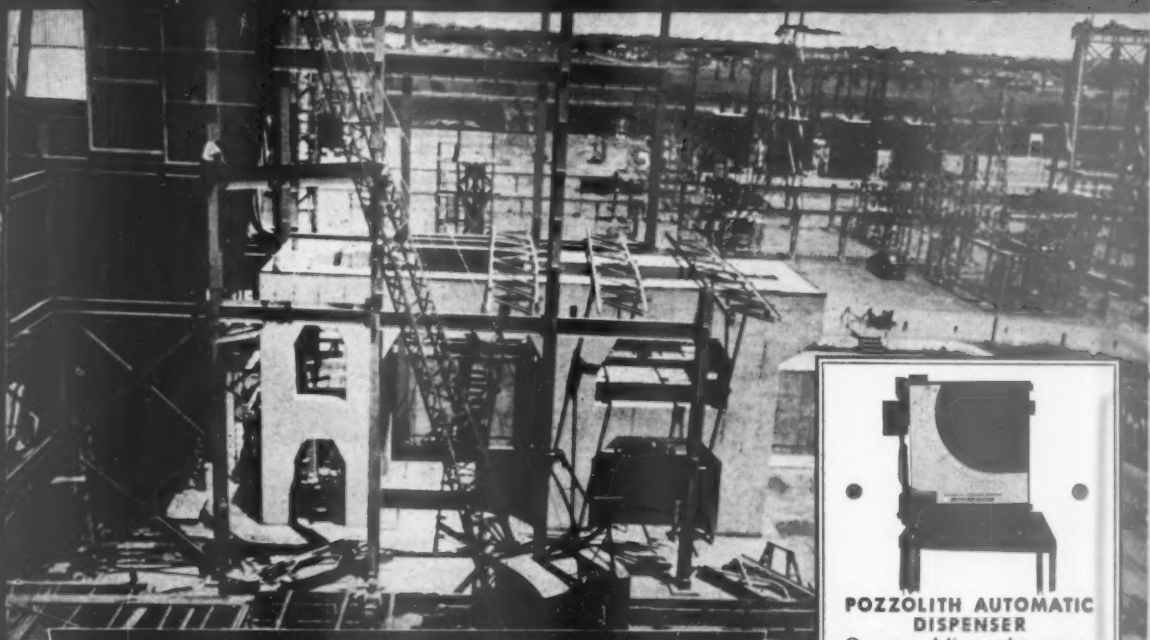
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CONCRETE BURIAL VAULTS



BERG VAULT CO.

Pedestal for Arizona's Largest Turbo-Generator Produced in One Continuous Pour



Turbo-Generator Pedestal, Central Arizona Power & Light Co., Phoenix, Arizona. Power Company's men in charge of job—Mr. James A. Johnson, Construction Superintendent, Mr. Frank H. Edson, Asst. Construction Superintendent, and Elvin M. Parker, Job Foreman. Pozzolith Ready-Mixed Concrete supplied by Superior Sand & Gravel Co., Phoenix, Arizona.

POZZOLITH READY-MIXED CONCRETE

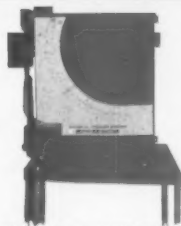
Concrete of ideal placeability, readily mobile and with the correct cohesive-ness essential to the successful pouring of this monolithic turbo-generator pedestal, was produced with Pozzolith by Superior Sand and Gravel Co., Arizona's leading ready-mixed company.

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4. GOOD APPEARANCE
5. ECONOMY

Over 400 leading ready-mixed plants in all parts of the country are producing Pozzolith Concrete — and many top design engineers are specifying it — for these reasons.

Write for full information.



POZZOLITH AUTOMATIC DISPENSER

Operator delivers the correct amount of Pozzolith, in liquid form, required for a batch, by simply setting the control dial and opening valve.

OVER 400 LEADING READY-MIXED PLANTS ARE NOW EQUIPPED WITH THIS DEVICE . . .

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Because a producer can, at lower cost:

1. Produce concrete of low permeability . . . with normal Portland cement.
2. Produce high-early strength concrete . . . with normal Portland cement.
3. Produce air entrained concrete without strength loss . . . with normal Portland cement.
4. Produce all of the above properties out of one cement bin . . . with normal Portland cement — stepping up production, reducing inconvenience in handling and cutting costs.

In normal mixes, concrete of any given durability, strength and workability, is produced more economically with Pozzolith than by any other means.

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New Holland Concrete Products, Inc.

Reinforced Concrete Pipe
Ready-Mix Concrete
Building Blocks
Metal Windows
New Holland
Pennsylvania
Telephone 718
November 27, 1950

Stearns Mfg. Company
Adrian, Michigan
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We started using our first Stearns equipment in 1944 when we purchased a Stearns Clipper and a Stearns 28 cubic ft. mixer. We continued to operate with this equipment until 1949 when we moved into our newly built, relocated Concrete Products plant designed to manufacture concrete block, concrete pipe and ready mix concrete.

In this plant we installed a Stearns No. 15 Block Machine with a pallet return, double pallet offbearer and a Stearns 50 cubic ft. mixer.

We were so well pleased with the quality of the blocks produced and the operation of this equipment that in October 1950 we added the second Stearns No. 15 with pallet return and offbearer and another Stearns 50 cu. ft. mixer.

With this equipment we are now producing six 8" units with three men where in 1944 to 1948 we were producing one 8" block per cycle, also by using three men.

We feel that in using our Stearns equipment we are able to supply our customers with a concrete block of uniform size, high compaction and load bearing strength.

Our experience in dealing with the Stearns Manufacturing Company in the past has been entirely satisfactory and we would be glad to recommend their equipment to those who may be interested in producing a quality block at a minimum cost.

Yours very truly,
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By Ivan M. Martin
President

1MM/rel
mob

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STEARNS 15



STEARNS 50



JOLTCHRES



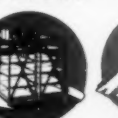
CLIPPER STRIPPERS



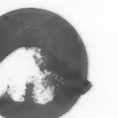
MIXERS



SKIP LOADERS

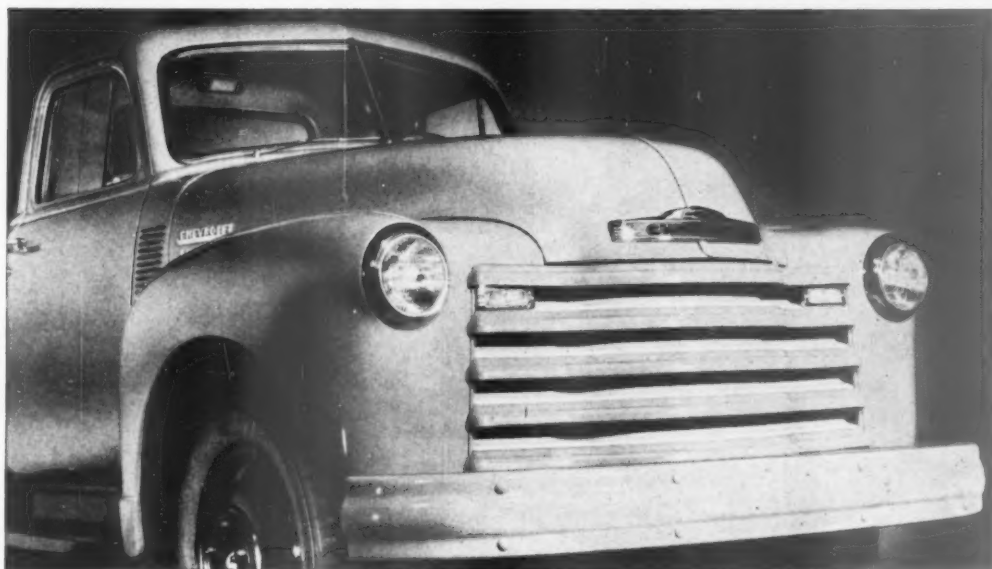


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G-150 Wagon Drill makes drilling easy



G-150 Wagon Drill

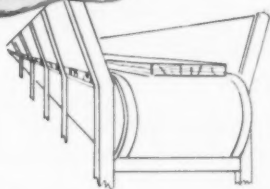


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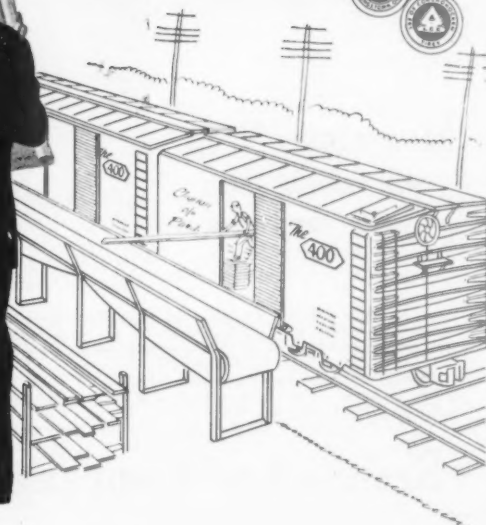
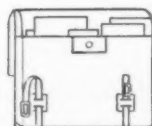
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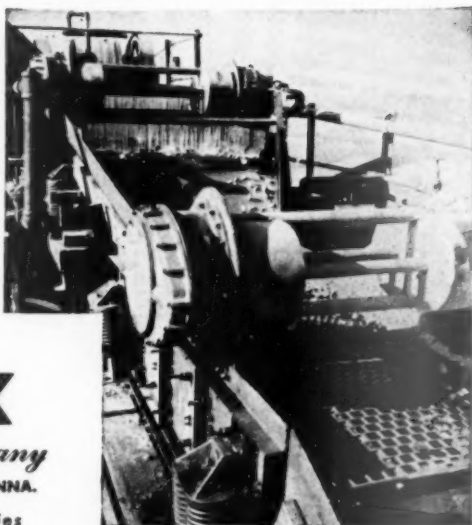
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better than new



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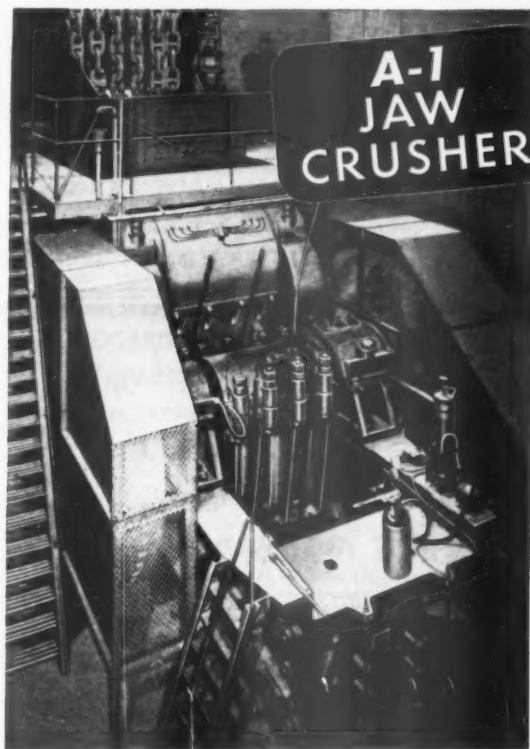
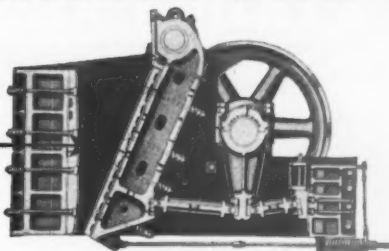
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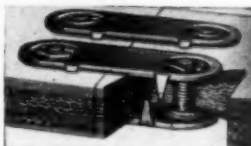
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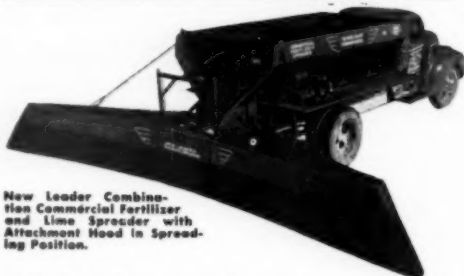


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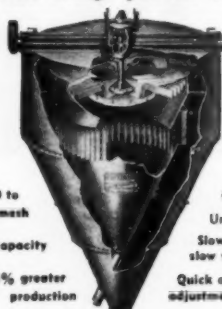
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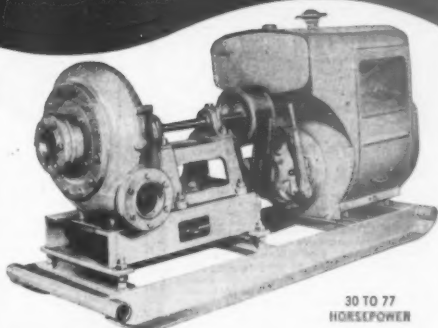
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14"	4	1 1/16"	1 3/8"	28 Oz.
16"	4	1 1/8"	1 3/8"	28 Oz.
18"	4	1 1/8"	1 3/8"	28 Oz.
20"	4	1 1/8"	1 3/8"	28 Oz.
22"	5	1 1/8"	1 3/8"	28 Oz.
24"	5	1 1/8"	1 3/8"	28 Oz.
26"	5	1 1/8"	1 3/8"	28 Oz.
28"	5	1 1/8"	1 3/8"	28 Oz.
30"	5	1 1/8"	1 3/8"	28 Oz.
32"	6	1 1/8"	1 3/8"	32 Oz.
34"	6	1 1/8"	1 3/8"	32 Oz.
36"	6	1 1/8"	1 3/8"	32 Oz.
38"	6	1 1/8"	1 3/8"	32 Oz.
40"	6	1 1/8"	1 3/8"	32 Oz.
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1—3"x8" 3 Deck Vibrator Screen

1—5 yd. Bin 1—3 yd. Bin

KUBIAK SAND AND GRAVEL PLANT

R. R. 2, Box 303 A South Bend, Ind.

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CRUSHING PLANT

10"x36" Jaw—No. 3 A. C. Pulverator

50"x18" belt conveyor—30 ton bin.

1 60 H.P. motor 1 30 H.P. and 1 3

H.P. all 440 volts plus 10"x10" house

for switches etc. on skids ready to

move all wired. All except hopper in

perfect shape. All for \$7000, run less

than 200 hours

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**CONSULT US BEFORE BUYING OR SELLING USED
FARREL-BACON CRUSHERS SIZES 60"x48" to 10"x7"**

As manufacturers of these machines we are in a position to assure you as to condition and operating ability. Send for catalog.
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EXCELLENT CONDITION

No. 0 Raymond Automatic Pulverizer Unit with Double Whizzer Separator—Hydrated Lime Feeder—Allis Chalmers Speed Changer, RF-22-N-44 Exhauster, and 8" Tubular Dust Collector.

The Eagle-Picher Company
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BACK-HOE for Model 4 Northwest 1 yd. In excellent condition.

BOOM for Model 80 Northwest 65' with bridle blocks and sheaves.

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Completely rebuilt new or near new factory seconds and used equipment including lime boilers, coal boilers, conveyors, cement boilers, bulk feed bodies etc. All guaranteed. Savings of 20% to 50%. Let us know your wants.

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Estate must sell established sand and gravel business in small Kansas county-seat town, also will sell separately following items: D-8 800 cat motor, 6" I&B pump on platform complete, some 2" and 4" pipe. Long conveyor—60 ft., small motor and vibrator, steel bin.

CECELIA DE FOREST, ADMINISTRATRIX
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COMPLETE SAND PIT EQUIPMENT FOR SALE

Located in Cleveland area, now in use as a water pumping operation. Includes complete washing plant (Pioneer 305W) less than two years old. Dredge with pump and equipment. Atlas conveyor 22 ft. long, 18 in. wide, with motor. Osgood crane, Model 200 with 30 ft. boom (new in December, 1949).

All immediately available at a very low price.

McDonald, Hopkins & Hood
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110" Steel Mast
225 H.P. Model E Diesel Engine with 250 H.P., 230 Volt D.C. Generator. Completely overhauled and in good running condition.

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One Lith-I-Bar 2-Block Fully Automatic Machine
Like New, 10 Months Old.
Phone or Write

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FOR SALE

1 Allis-Chalmers Generator, 350 Volts, 715 Amps, 1200 RPM, Serial No. 132379.

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1 Allis-Chalmers 300 HP, 350 Volts, 1000 RPM, 699 1 hour or 520 Cont. Svc. Drawworks Motor Serial No. 132452.

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1 Caterpillar Diesel Electric Set, No. 34-15-S, 21-KW, With 3 1/4" Bore x 5" Stroke Caterpillar Diesel Motor, with skids and roof.

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250 KVA—440 volt—G.E. Diesel Generator Set—like new 48" Gyroscopic Crusher—Grate Crushers—Roll Crushers, Cone Crushers—Jaw Crushers—40"x42"—25"x40"—R.B.—21"x36"—20"x36"—18"x36"—15"x26"—10"x36"—Complete crushing plant including 42"x36" Jaw—Others.
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1682x30, 1684x30, 1686x30, 1688x30, 1690x30, 1692x30, 1694x30, 1696x30, 1698x30, 1700x30, 1702x30, 1704x30, 1706x30, 1708x30, 1710x30, 1712x30, 1714x30, 1716x30, 1718x30, 1720x30, 1722x30, 1724x30, 1726x30, 1728x30, 1730x30, 1732x30, 1734x30, 1736x30, 1738x30, 1740x30, 1742x30, 1744x30, 1746x30, 1748x30, 1750x30, 1752x30, 1754x30, 1756x30, 1758x30, 1760x30, 1762x30, 1764x30, 1766x30, 1768x30, 1770x30, 1772x30, 1774x30, 1776x30, 1778x30, 1780x30, 1782x30, 1784x30, 1786x30, 1788x30, 1790x30, 1792x30, 1794x30, 1796x30, 1798x30, 1800x30, 1802x30, 1804x30, 1806x30, 1808x30, 1810x30, 1812x30, 1814x30, 1816x30, 1818x30, 1820x30, 1822x30, 1824x30, 1826x30, 1828x30, 1830x30, 1832x30, 1834x30, 1836x30, 1838x30, 1840x30, 1842x30, 1844x30, 1846x30, 1848x30, 1850x30, 1852x30, 1854x30, 1856x30, 1858x30, 1860x30, 1862x30, 1864x30, 1866x30, 1868x30, 1870x30, 1872x30, 1874x30, 1876x30, 1878x30, 1880x30, 1882x30, 1884x30, 1886x30, 1888x30, 1890x30, 1892x30, 1894x30, 1896x30, 1898x30, 1900x30, 1902x30, 1904x30, 1906x30, 1908x30, 1910x30, 1912x30, 1914x30, 1916x30, 1918x30, 1920x30, 1922x30, 1924x30, 1926x30, 1928x30, 1930x30, 1932x30, 1934x30, 1936x30, 1938x30, 1940x30, 1942x30, 1944x30, 1946x30, 1948x30, 1950x30, 1952x30, 1954x30, 1956x30, 1958x30, 1960x30, 1962x30, 1964x30, 1966x30, 1968x30, 1970x30, 1972x30, 1974x30, 1976x30, 1978x30, 1980x30, 1982x30, 1984x30, 1986x30, 1988x30, 1990x30, 1992x30, 1994x30, 1996x30, 1998x30, 2000x30, 2002x30, 2004x30, 2006x30, 2008x30, 2010x30, 2012x30, 2014

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FOR SALE

USED EQUIPMENT FOR SALE

- 1-3 $\frac{1}{2}$ Yd. Shovel, Model 3 Northwest Caterpillar, Year Model 1929—Serial No. 2066 Powered with Wisconsin Gas Engine. Condition: Good — Motor Overhauled 1949 Price: \$4,000.00.
- 2—Shovel Fronts for $\frac{3}{4}$ Yd. Bucyrus-Erie Type B Steam Shovels, Booms, Sticks and Dippers. Condition: Excellent. Price: \$500.00 each.
- 1—Speed Reducer, Model 9DA Falk, 100 H.P. Complete with Couplings. Ratio 11.5 to 1. Shaft Dia.—Input 2". Output 5". Condition: Excellent Price: \$1,000.00.
- 1—Electric Converter, Model ECES Reliance, 1 $\frac{1}{2}$ H.P.—8 KVA—440 V.—60 Cy.—3 Phase Continuous 40°C RPM 900. Condition: Good. Price: \$350.00.
- 1—Air Compressor, 220 ft. Ingersoll-Rand Single Stage. Mounted on International Truck Chassis. Condition: Compressor and Truck—Complete Unit—Good. Price: \$1,000.00.
- 1—Roll Crusher, Martin 18" Style F Condition: Good. Price: \$400.00.
- 1—Sectional Belt Conveyor—Farquhar No. 346 14"x17" with Motor 1 HP-AC 3 Phase—60 Cy.—440V. Condition: Good. Price: \$200.00.
- 2—Well Drills, Loomis Model 44 Clipper Full Crawler Blast Hole. Gasoline Powered. Condition: Excellent. Price: \$1,500.00 each.
- 1—Scale, Exact Weight Style No. 2225, 10 lb. Tare Beam, Dial 25 lb. Under 5 lb. Over with Hushite Bag-holder. Condition: Good. Price: \$200.00.
- 1—Chrysler Motor, Type C 36-520 8 cylinders 3 $\frac{1}{4}$ "x4 $\frac{1}{4}$ " Gasoline with electric starter. Including \$150 worth of spare parts. Condition: Good. Price: \$500.00.

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Special—small single crusher Diamond port, road gravel plant, low price.
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EQUIPMENT BARGAINS

Completely Rebuilt Williams Clamshell Digging Bucket, With New Cutting Lips, Teeth, Pins, and Bushings. Condition Like New.

60 Ton Watson-Stillman Hydraulic Jacks, New—In Original Shipping Cases.

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FOR SALE

1 $\frac{1}{2}$ yd. Model 6 Northwest Crane Dr. line, gas \$10,500
1 $\frac{1}{2}$ yd. N. W. Model 104 Stripper Shovel 50" dragline diesel \$8,750
1 $\frac{1}{2}$ yd. Lima 101 Gas Shovel \$7,200
 $\frac{3}{4}$ yd. General Shovel, Crane boom, Gas powered \$3,800
 $\frac{1}{2}$ yd. K2 Bay City Shovel, Crane \$4,800
 $\frac{3}{4}$ yd. Unit Crane, Gas on 12 rubber tires \$10,500
8 $\frac{1}{2}$ x10 DC 3-Drum Steam Hoist with Hoiler \$1,200
 $\frac{3}{4}$ yd. Re-Hand. Clamshell-Teeth \$750
 $\frac{3}{4}$ yd. Clamshell with Teeth \$475
D13000 Cat. Power Unit Diesel overhauled Clutch and Pulley \$3,500
"99" Austin Diesel Power Grader 13" Blade \$2,800
Adams "51" Diesel Power Grader 13" Blade \$1,800
Adams "301" Gas Power Grader 12" Blade \$1,300
Dayton Dowd Centr. Pump 60 HP Motor \$50
100' Troughed Belt Conv. Frame only Head and Tail 24" (Belt) \$1,500
50' Troughed Belt Conv. 140", 24" Belt Complete \$1,400
3 $\frac{1}{2}$ yd. Per Min. Bucket Loaders Halsas and H-G \$4,500
24"x36" "NEW" Pioneer Jaw crusher \$12,500
100 to 300 HP Steam Boilers, other sizes also \$25.00 Per HP and Up
7 Ton 36" Ga. Plymouth Gas Loco. 4 yd. Cars \$3,000

New Cement Bins complete with Elevator, Weigh Hatcher, Motors, Complete Packages, 250-bbl. \$5175; 400-bbl. \$6450
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SAND PLANT—FOR SALE

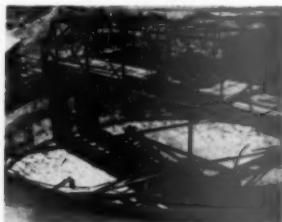
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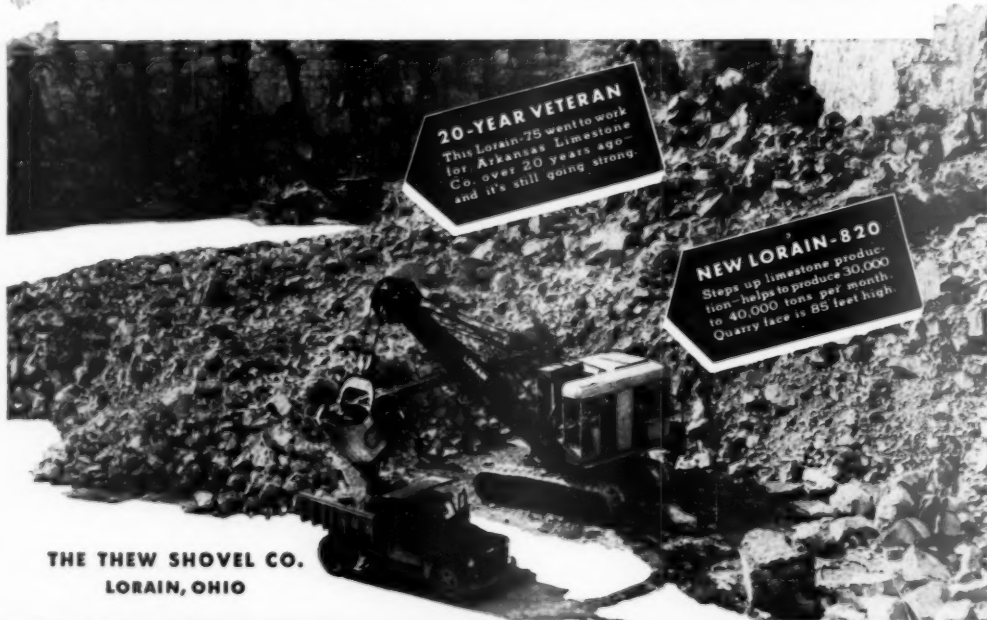
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DIRECTORY OF MANUFACTURERS' EQUIPMENT

1951

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Numbers under manufacturers listings identify subdivision in which their equipment falls. See beginning of each classification for code identification.

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- **BUFFALO FORGE CO.**, 490 Broadway, Buffalo 5, N. Y.
- **CLARAGE FAN CO.**, 619 Porter St., Kalamazoo 16, Mich.
- **CURTIS PNEUMATIC MACHINERY CO.**, 1988 Kienlen Ave., St. Louis 20, Mo.

- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.

- **STEARNS-ROGERS MFG. CO.**, 1720 California St., Denver 2, Colo.

- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

- **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

AIR CONVEYORS (see Conveyors Air)

AIR ENTRAINING AGENTS

- **AMERICAN CYANAMID CO.**, 30 Rockefeller Plaza, New York 20, N. Y.
- **AMERICAN FLUESIT CO., INC.**, 4011 Red Bank Rd., Cincinnati 27, Ohio
- **AUTOLINE LUBRICANTS CO., PROTEX DIV.**, 1331 West Evans, Denver 9, Colo.
- **THE CARTER-WATERS CORP.**, 2440 Pennway, Kansas City 8, Mo.
- **DEWEY AND ALMY CHEMICAL CO.**, 62 Whittemore Ave., Cambridge 40, Mass.
- **HERCULES POWDER CO.**, 946 King St., Wilmington, Del.
- **HOPPER PRODUCTS, INC.**, 12 E. 41st St., New York 17, N. Y.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

A. C. HORN CO., INC., 10th St. and 44th Ave., Long Island City 1, N. Y.

• **THE MASTER BUILDERS CO.**, 7016 Euclid Ave., Cleveland 3, Ohio

E. L. MOORE CO., 1931 Oakwood St., Pasadena 7, Calif.

NEWPORT INDUSTRIES, INC., 230 Park Ave., New York 17, N. Y.

NOPCO CHEMICAL CO., First and Essex Sts., Harrison, N. J.

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N. J.

THE RICHARD SALES CORP., 190 Warren St., Jersey City, N. J.

• **SOLVAY SALES DIV., ALLIED CHEMICAL & DYE CORP.**, 40 Rector St., New York 6, N. Y.

L. SONNEBORN SONS, INC., 300 Fourth Ave., New York 10, N. Y.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt St., Milwaukee 12, Wis.

CHARLES R. WATTS & CO., 4121 Sixth Ave. N. W., Seattle 7, Wash.

AIR FILTERS

AMERICAN AIR FILTER CO., INC., 215 Central Ave., Louisville 8, Ky.

E. D. BULLARD CO., 275 Eighth St., San Francisco 3, Calif.

THE DeVILBISS CO., 300 Phillips Ave., Toledo 1, Ohio

FRAM CORPORATION, Providence 16, R. I.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.

WILLSON PRODUCTS, INC., 248 Washington St., Reading, Pa.

AIR HEATERS

• **THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N. Y.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.

MAHR MFG. CO. DIV. DIAMOND IRON WORKS, 1728 2nd St. N., Minneapolis 11, Minn.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

AIR LINE LUBRICATORS

• **CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

KNOX MFG. CO., 226 W. Clinton Ave., Oaklyn, N. J.

LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.

• **NEW HAVEN VIBRATOR CO.**, 145 Chestnut St., New Haven 7, Conn.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

AIR RECEIVERS, Tanks, Steel

CURTIS PNEUMATIC MACHINERY CO., 1988 Kielen Ave., St. Louis 20, Mo.

• **GARDNER-DENVER CO.**, Quincy, Ill.

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg., Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

GRAVER TANK & MFG. CO., INC., 4809 Tod Ave., East Chicago, Ind.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **MANITOWOC ENGINEERING WORKS**, Manitowoc, Wis.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

AIR SEPARATORS

ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.

• **AMERICAN CYANAMID CO.**, 30 Rockefeller Plaza, New York 20, N. Y.

BLOWER APPLICATION CO., 110 E. 30th St., Milwaukee 10, Wis.

THE DeVILBISS CO., 300 Phillips Ave., Toledo 1, Ohio

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.

• **RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO., INC.**, 1315 N. Branch St., Chicago 22, Ill.

SEPARATIONS ENGINEERING CORP., 110 E. 42nd St., New York 17, N. Y.

• **F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.

STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

• **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N. Y.

• **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 N. Broadway, St. Louis 6, Mo.

AIR TRANSPORT SYSTEMS (see Conveyors Air)

ALLOYS

1. Abrasion Resisting

2. Heat Resisting

3. Manganese

ALLIED STEEL PRODUCTS, INC., 7835 Broadway, Cleveland 5, Ohio

• **ALLOY RODS CO.**, 3105 W. Market St., York, Pa.

1—2—3

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

1—3

BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.

1—2—3

THE BALDWIN LOCOMOTIVE WORKS, Philadelphia 42, Pa.

1—2—3

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

1—2

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

1—2—3

CHICAGO STEEL FOUNDRY CO., 3720 So. Kedzie Ave., Chicago 32, Ill.

1—2

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Oreg.

1—2—3

• **ELECTRO-ALLOYS DIV., AMERICAN BRAKE SHOE CO.**, Taylor St. & Abbey Road, Elyria, Ohio

1—3

THE FAHRALLOY CO., 149th Loomis St., Harvey, Ill.

1—2

FARRELL-CHEEK STEEL CO., Sandusky, Ohio

1—

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.

1

INTERNATIONAL NICKEL CO., 67 Wall St., New York 5, N. Y.

1

JONES & LAUGHLIN STEEL CORP., Third Ave. & Ross St., Pittsburgh 30, Pa.

1

KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.

3

LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.

1—2—3

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

1—3

M-NALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.

1

• **RESISTO-LOY CO.**, 127 Bnylin St., S.W., Grand Rapids 7, Mich.

1—2—3

• **JOSEPH T. RYERSON & SON, INC.**, 7558 West 16th St., Chicago 80, Ill.

1—2—3

• **STODDY COMPANY**, 11979 E. Slousway Ave., Whittier, Calif.

1—2—3

STROM PROCESS STEEL CO., 1428 High St., Pittsburgh 12, Pa.

1—2—3

STULZ-SICKLES CO., 134 Lafayette St., Newark 5, N. J.

1—3

• **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.

1—3

• **THE TIMKEN ROLLER BEARING CO.**, 1835 Duerber Ave., S.W., Canton 6, Ohio

1—2—3

UNITED STATES STEEL CO., Pittsburgh 30, Pa.

1—2—3

WALL COLMONOY CORP., 19345 John R. St., Detroit 3, Mich.

1—2

ALTERNATORS, Electric

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

CROCKER-WHEELER ELECTRIC MFG. CO. DIV. OF ELLIOTT CO., Amper, N. J.

ELECTRIC MACHINERY MFG. CO., 1331 Tyler St. N.E., Minneapolis 14, Minn.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

INTERNATIONAL DIESEL ELECTRIC CO., INC., 13-02 44th Ave., Long Island City 1, N. Y.

KATO ENGINEERING CO., 108 Maxfield St., Mankota, Minn.

AMMETERS, Electric

THE BRISTOL CO., Waterbury 20, Conn.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

WHEELCO INSTRUMENTS CO., 847 W. Harrison St., Chicago 7, Ill.

• **ANTI-FRICTION BEARINGS (see Bearings)**

• **APRON FEEDERS (see Feeders, Apron)**

• **ARC WELDING APPARATUS (see Welding Machines, Arc)**

ASPHALT MIXING PLANTS

BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

HETHERINGTON & BERNER INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.

• **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa

• **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio

KWIK-MIX CO., 235 W. Grand Ave., Port Washington, Wis.

MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

• **PETTIBONE MULLIKEN CORP.**, 4710 W. Division St., Chicago 51, Ill.

• **PIONEER ENG. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.

SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.

AUTOClaves, Laboratory

AMERICAN INSTRUMENT CO., INC., Silver Spring, Md.

CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.

THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

AXLES & WHEELS, Car & Locomotive

THE BALDWIN LOCOMOTIVE WORKS, Philadelphia 42, Pa.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

THE CHASE FOUNDRY & MFG. CO., 2300 S. Parsons Ave., Columbus 7, Ohio

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Road, Niagara Falls, N. Y.

• **EATON MANUFACTURING CO.**, 739 E. 140 St., Cleveland 10, Ohio

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.

ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.

H. K. PORTER CO., INC., 49th & Harrison Sts., Pittsburgh 1, Pa.

UNITED STATES STEEL CO., Pittsburgh 30, Pa.

• **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

B

BABBITT METAL (see Bearing Metals)

BAG CLEANERS

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.

• **MULTIPLEX MACHINERY CORP.**, Elmore, Ohio

THE NORTHERN BLOWER CO., 6408 Barborton Ave., Cleveland 2, Ohio

BAGGING MACHINES

• **BEMIS BRO. BAG CO.**, 408 Pine St., St. Louis 2, Mo.

BAGPAK, INC., 220 E. 42nd St., New York 17, N. Y.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

ST. REGIS SALES CORP., 230 Park Ave., New York 17, N. Y.
 * L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 RICHARDSON SCALE CO., Van Houten Ave., Clifton, N. J.

BAGS, Dust Collector

AMERICAN WHEELABRATOR & EQUIP. CORP., 439 S. Byrkit St., Mishawaka, Ind.
 THE NORTHERN BLOWER CO., 6408 Barberton Ave., Cleveland 2, Ohio
 PANGBORN CORP., Hagerstown, Md.

BAGS

1. Paper
 2. Cloth
 * REMIS BRO. BAG CO., 408 Pine St., St. Louis 2, Mo.
 1—2
 CHASE BAG CO., 309 W. Jackson Blvd., Chicago 6, Ill.
 1—2
 EQUITABLE PAPER BAG CO., 47-00, 31st Place, Long Island City, N. Y.
 1—2
 FULTON BAG & COTTON MILLS, P. O. Box 1726, Atlanta 1, Ga.
 1—2
 HAMMOND BAG & PAPER CO., Lombiller Blvd., Wellsburg, W. Va.
 BAGPAK, INC., 220 E. 42nd St., New York 17, N. Y.
 JAITE COMPANY, Jaite, Ohio
 1—2
 KRAFT BAG CORP., 630 Fifth Ave., New York 20, N. Y.
 1—2
 THE RAYMOND BAG CO., Tytus Ave. & Enoch Dr., Middletown, Ohio
 1—2
 ST. REGIS SALES CORP., 230 Park Ave., New York 17, N. Y.
 1—2
 SECURITY BAG CO., 96 Clifton Pl., Brooklyn 5, N. Y.
 1—2
 UNION BAG AND PAPER CORP., 233 Broadway (Woolworth Bldg.), New York 7, N. Y.
 1

BAG TIES, Wire

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
 * REMIS BRO. BAG CO., 408 Pine St., St. Louis 2, Mo.
 CHASE BAG CO., 309 W. Jackson Blvd., Chicago 6, Ill.
 MONTGOMERY & CO., INC., 53 Park Pl., New York 7, N. Y.
 SECURITY BAG CO., 96 Clifton Pl., Brooklyn 5, N. Y.

BALL BEARINGS, (see Bearings, Ball)

BALL MILLS (see Mills, Ball)

BALLS & SLUGS, Grinding, (see Grinding Media)

BARGES, Sand and Gravel, etc.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 6, Ind.
 * EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa
 GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.
 INGALLS SHIPBUILDING CORP., P. O. Drawer 2632, Birmingham 2, Ala.

MANITOWOC ENGINEERING WORKS, Manitowoc, Wisc.
 DUMPCRETE DIV., MAXON CONSTRUCTION CO., INC., 131 N. Ludlow St., Dayton 2, Ohio
 MILLVILLE IRON WORKS, INC., 6th St. & Florence Ave., Millville, N. J.
 * YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

BATCHERS, BIN

1. Weighing
 2. Volumetric
 ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
 1—2
 AUTOMATIC LIQUID METER CO., 1372-1378 E. 15th St., Los Angeles 12, Calif.
 1—2
 THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
 * BESSER MFG. CO., 205 47th St., Alpena, Mich.
 1—2
 BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wisc.
 2
 BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
 1—2
 BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio
 1—2
 L. BURMEISTER CO., 4539 W. Mitchell St., Milwaukee 14, Wis.
 1—2
 BUILDERS - PROVIDENCE, INC., 345 Harris Ave., Providence 1, R. I.
 1—2
 * BUTLER BIN CO., Box 407, Waukesha, Wisc.
 1—2
 CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
 1—2
 CONSTRUCTION MACHINERY CO.'S, Glenwood & Vinton Sts., Waterloo, Iowa
 1—2
 THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.
 1—2
 * DRY RAPID INDUSTRIES, INC., P. O. Box 95, North Side Branch, Atlanta 3, Ga.
 2
 ERIE STEEL CONST. CO., Giest Road & N. P. R. R., Erie, Pa.
 1—2
 FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
 1—2
 * FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo.
 1—2
 GAR-BRO MFG. CO., 2416 E. 16th St., Los Angeles 21, Calif.
 1—2
 GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
 1—2
 HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.
 1—2
 THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
 1
 THE HOWE SCALE CO., Rutland, Vt.
 1—2
 * IOWA MFG. CO., 916-16th St., N.E., Cedar Rapids, Iowa
 1—2
 T. JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
 1
 * TVE & S. JOHNSON CO., P. O. Box 71, Champaign, Ill.
 1
 * LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wisc.
 1—2

MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.
 1
 MEYER SCALES, INC., 449 Central Ave., Orange, N. J.

1
 MIXERMOBILE MANUFACTURERS, 6855 N.E. Halsey St., P. O. Box 5108, Portland 16, Ore.
 1
 NOBLE CO., 1860 Seventh St., Oakland 20, Calif.
 1
 OMEGA MACHINE CO., P. O. Box 1342, Providence 1, R. I.
 1—2
 RICHARDSON SCALE CO., Van Houten Ave., Clifton, N. J.

1
 SCHAFFER PLOIDOMETER CO., 2828 Smallman St., Pittsburgh 22, Pa.
 1
 SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N. J.
 1
 * SINTERING MACHINERY CORP., Netcong, N. J.
 1—2
 STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
 1
 STREETER-AMET CO., 4101 N. Ravenswood, Chicago 13, Ill.

1
 * SYNTRON CO., 450 Lexington Ave., Homer City, Pa.
 1—2
 TOLEDO SCALE CO., 1090 Telegraph Road, Toledo 12, Ohio

1—2
 CHARLES R. WATTS & CO., 4121 Sixth Ave. N.W., Seattle 7, Wash.
 2
 THE WEBB CORP., 402 E. Broadway, Webb City, Mo.
 1
 WILLARD CONCRETE MACHINERY CO., LTD., 2906 Imperial Highway, Lynwood, Calif.
 1
 WINSLOW GOVT. STANDARD SCALE WKS., INC., 25th and Haythorne Ave., Terre Haute, Ind.

1
 THE YALE & TOWNE MFG. CO., Philadelphia 15, Pa.
 1—2

BATCHING PLANTS

BARBER-GREENE CO., 631 W. Park Ave., Aurora 16, Ill.
 BEAUMONT-BIRCH CO., 1503 Race St., Philadelphia, Penna.
 * BLAW-KNOX DIV. OF BLAW-KNOX CO., P. O. Box 1198, Pittsburgh 30, Pa.
 BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
 BONDED SCALE CO., 41 Bellview Ave., Columbus 7, Ohio
 L. BURMEISTER CO., 4539 W. Mitchell St., Milwaukee 14, Wis.
 * BUTLER BIN CO., Box 407, Waukesha, Wisc.
 CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
 CONSTRUCTION MACHINERY CO.'S, Glenwood & Vinton Sts., Waterloo, Iowa
 THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.
 DODSON MFG. CO., INC., 1463 Barwise, Wichita 2, Kansas
 ERIE STEEL CONST. CO., Giest Road & N. P. R. R., Erie, Pa.
 * FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo.
 GAR-BRO MFG. CO., 2416 E. 16th St., Los Angeles 21, Calif.
 GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
 HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.

THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio

I-T-E CIRCUIT BREAKER CO., 19th and Hamilton St., Philadelphia 30, Pa.

* LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wisc.

NOBLE CO., 1860 Seventh St., Oakland 20, Calif.

* THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

WINSLOW GOVT. STANDARD SCALE WKS., INC., 25th and Haythorne Ave., Terre Haute, Ind.

* WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

BATTERIES, Storage

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
 THE ELECTRIC STORAGE BATTERY CO., 19th St. & Allegheny Ave., Philadelphia 32, Pa.
 THE MARIETTA CONCRETE CORP., Westview, Box 356, Marietta, Ohio

BATTERY CHARGING EQUIPMENT

ALBERT & J. M. ANDERSON MFG. CO., 289-305 A St., Boston 10, Mass.
 B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
 THE ELECTRIC STORAGE BATTERY CO., 19th St. & Allegheny Ave., Philadelphia 32, Pa.
 * GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
 GENERAL SCIENTIFIC EQUIPMENT CO., 27th and Huntington Sts., Philadelphia 32, Pa.
 HOBART BROTHERS CO., Hobart Square, Troy, Ohio
 D. W. ONAN & SONS INC., University Ave., S.E., at 25th, Minneapolis 14, Minn.
 STERLING MACHINERY CORP., 411 Southwest Blvd., Kansas City 8, Mo.
 WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

BEARING METALS

THE BALDWIN LOCOMOTIVE WORKS, Philadelphia 42, Pa.
 CARBONITE METAL CO. INC., Box 305, Burlington, Wisc.
 * DODGE MANUFACTURING CORP., Mishawaka, Ind.
 THE INGALLS IRON WORKS CO., P. O. Drawer 2632, Birmingham 2, Ala.
 * LINK BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
 MAGNOLIA METAL CO., 18 W. Jersey St., Elizabeth 4, N. J.
 NATIONAL BEARING DIV., AM. BRAKE SHOE CO., 4930 Manchester St., St. Louis 10, Mo.
 * JOSEPH T. RYERSON & SON, INC., 2558 West 16th St., Chicago 80, Ill.
 UNITED AMERICAN METALS CORP., 200 Diamond St., Brooklyn 22, N. Y.

BEARINGS

1. Ball
 2. Roller
 3. Thrust
 BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.
 1—2—3
 BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
 1—2—3

* A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

2
•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

1-2-3
•DODGE MANUFACTURING CORP., Mishawaka, Ind.

1-2
•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

2
•THE FAPRI BEARING CO., 37 Booth St., New Britain, Conn.

1-2-3
•THE FEDERAL BEARINGS CO. INC., Poughkeepsie, N. Y.

1-3
•THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

3
•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

1-2-3
•MARLIN-ROCKWELL CORP., 402 Chandler St., Jamestown, N. Y.

1-2-3
•NEW DEPARTURE DIV. GENERAL MOTORS CORP., Bristol, Conn.

1
•NICE BALL BEARING CO., 30th & Hunting Park Ave., Philadelphia 40, Pa.

1-3
•NORMA - HOFFMAN BEARINGS CO., Hamilton Ave., Stamford, Conn.

1
•ROLLER BEARING CO. OF AMERICA, P.O. Box 480, Trenton 3, N. J.

2
•ROLLWAY BEARING CO., INC., 541 Seymour St., Syracuse 4, N. Y.

2-3
•S K F INDUSTRIES, INC., Front St. & Erie Ave., Philadelphia, Pa.

1-3
•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

1
•THE TIMKEN ROLLER BEARING CO., 1835 Dumber Ave., S. W., Canton 6, Ohio.

2-3
•TORRINGTON BEARING CO., Torrington, Conn.

BELT ALIGNERS

BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.

•THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

•THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LIPPMAHN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wisc.

•E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

•ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

•WEBSTER MFG. INC., Tiffin 16, Ohio

BELT CONVEYORS AND ACCESSORIES, (see Conveyors, Belt)

BELT CUTTERS

ARMSTRONG-BRAY & CO., 5364 Northwest Highway, Chicago 30, Ill.

CLIPPER BELT LACER CO., 974 Front Ave. N. W., Grand Rapids 2, Mich.

•FLEXIBLE STEEL LACING CO., 4607 Lexington St., Chicago 44, Ill.

BELT FASTENERS AND LACING

ARMSTRONG-BRAY & CO., 5364 Northwest Highway, Chicago 30, Ill.

•THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

•THE BRISTOL CO., Waterbury 20, Conn.

•CARLYLE RUBBER CO., INC., 62-66 Park Pl., New York 7, N. Y.

•CLIPPER BELT LACER CO., 974 Front Ave. N. W., Grand Rapids 2, Mich.

•CRESCENT BELT FASTENER CO., 480 Lexington Ave., New York 17, N. Y.

•FLEXIBLE STEEL LACING CO., 4607 Lexington St., Chicago 44, Ill.

•GREY-ROCK DIV., RAYBESTOS-MANHATTAN, INC., Manheim, Pa.

•THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

•J. E. RHODES & SONS, 35 North 6th St., Philadelphia 6, Pa.

•W. O. & M. W. TALCOTT, INC., 91 Sabin St., Providence 1, R. I.

BELT PULLEYS, (see Pulleys, Conveyor, Etc.)

BELT TRIPPERS, (see Conveyor Belt Trippers)

BELTING, Chain

•THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.

•GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•MORSE CHAIN CO., 7601 Central Ave., Detroit 8, Mich.

•TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

BELTING, Heat Resistant

•VICTOR BALATA & TEXTILE BELTING CO., 53 Park Pl., New York 7, N. Y.

•C. R. DANIELS, INC., BELTING DIV., P. O. Box 6908, Baltimore 16, Md.

•MANHEIM MFG. & BELTING CO., 675 Manbel St., Manheim, Pa.

•J. R. RHODES & SONS, 35 N. 6th St., Philadelphia 6, Pa.

BELTING, Rubber

1. Conveyor
2. Bucket Elevator
3. Power Transmission

•VICTOR BALATA & TEXTILE BELTING CO., 53 Park Pl., New York 7, N. Y.

•BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.

•BOSTON WOVEN HOSE & RUBBER CO., P. O. Box 1071, Boston 3, Mass.

•CARLYLE RUBBER CO., INC., 62-66 Park Pl., New York 7, N. Y.

•THE CINCINNATI RUBBER MFG. CO., Franklin Ave., Cincinnati 12, Ohio

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•DODGE MANUFACTURING CORP., Mishawaka, Ind.

•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

•THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.

•GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

•L. H. GILMER CO., DIV. OF UNITED STATES RUBBER CO., Tacony 35, Pa.

•GOODALL RUBBER CO., Whitehead Road, Trenton 4, N. J.

•B. F. GOODRICH CO., Akron 11, Ohio

•THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

•GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.

•HAMILTON RUBBER MFG. CORP., Mead St., Trenton 3, N. J.

•HEWITT RUBBER DIV. HEWITT-ROBINS, INC., 240 Kensington Ave., Buffalo 5, N. Y.

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•McNALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.

•QUAKER PACIFIC RUBBER CO., 598 Potero Ave., San Francisco 10, Calif.

•QUAKER RUBBER CORP., Tacony & Comly Sts., Philadelphia 24, Pa.

•RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.

•REPUBLIC RUBBER DIV. LEE RUBBER & TIRE CORP., Albert St., Youngstown 1, Ohio

•W. A. RIDDELL CORP., Bucyrus, Ohio

•TECO, INC., 801 N. Second St., St. Louis 2, Mo.

•THERMIDOL COMPANY, Trenton, N. J.

•TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill.

•TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.

•UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

•WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

•THE AMERICAN PULLEY CO., 4200 Wissahickon Ave., Philadelphia 29, Penna.

•BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.

•BOSTON WOVEN HOSE & RUBBER CO., P. O. Box 1071, Boston 3, Mass.

•CARLYLE RUBBER CO., INC., 62-66 Park Pl., New York 7, N. Y.

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

•THE DAYTON RUBBER CO., Dayton 1, Ohio

•R. & J. DICK CO., INC., P. O. Box 388, Passaic, N. J.

•DODGE MANUFACTURING CORP., Mishawaka, Ind.

•THE FIRSTSTONE TIRE & RUBBER CO., 1200 Firestone Parkway, Akron 17, Ohio

•THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.

•GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

•L. H. GILMER CO., DIV. OF UNITED STATES RUBBER CO., Tacony 35, Pa.

•B. F. GOODRICH CO., Akron 11, Ohio

•THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

•W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Road, Chicago 24, Ill.

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LOVEJOY FLEXIBLE COUPLING CO., 5009 W. Lake St., Chicago 44, Ill.

•MANHEIM MFG. & BELTING CO., 675 Manbel St., Manheim, Pa.

•THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.

•PYOTT FOUNDRY & MACHINE CO., 328 N. Sangamon St., Chicago 7, Ill.

•QUAKER PACIFIC RUBBER CO., 598 Potero Ave., San Francisco 10, Calif.

•QUAKER RUBBER CORP., Tacony & Comly Sts., Philadelphia 24, Pa.

•RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.

•REPUBLIC RUBBER DIV. LEE RUBBER & TIRE CORP., Albert St., Youngstown 1, Ohio

•J. E. RHODES & SONS, 35 North 6th St., Philadelphia 6, Pa.

•THERMIDOL CO., Trenton, N. J.

•UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

•WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

•THE CAMBRIDGE WIRE CLOTH CO., Good Will Road, Cambridge, Md.

•THE COLORADO FUEL & IRON CORP., P. O. Box 1920, Denver 1, Colo.

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

•KORB-PETTIT WIRE FABRICS & IRON WORKS, INC., 1505-15 N. Mascher St., Philadelphia 22, Pa.

•MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

•B. F. GOODRICH CO., Akron 11, Ohio

•THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

•W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Road, Chicago 24, Ill.

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LOVEJOY FLEXIBLE COUPLING CO., 5009 W. Lake St., Chicago 44, Ill.

•MANHEIM MFG. & BELTING CO., 675 Manbel St., Manheim, Pa.

•THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.

•PYOTT FOUNDRY & MACHINE CO., 328 N. Sangamon St., Chicago 7, Ill.

•QUAKER PACIFIC RUBBER CO., 598 Potero Ave., San Francisco 10, Calif.

•QUAKER RUBBER CORP., Tacony & Comly Sts., Philadelphia 24, Pa.

•RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.

•REPUBLIC RUBBER DIV. LEE RUBBER & TIRE CORP., Albert St., Youngstown 1, Ohio

•J. E. RHODES & SONS, 35 North 6th St., Philadelphia 6, Pa.

•THERMIDOL CO., Trenton, N. J.

•UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

•WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

•THE CAMBRIDGE WIRE CLOTH CO., Good Will Road, Cambridge, Md.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

BENDING ROLLS, Reinforcing Steel

- **THE ALLEN - SHERMAN - HOFF CO.**, 1435 Locust St., Philadelphia 2, Pa.
- **AMERICAN MANGANESE STEEL DIV., AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
- **THE BALDWIN LOCOMOTIVE WORKS**, Philadelphia 42, Pa.
- **BEAUMONT-BIRCH CO.**, 1505 Rose St., Philadelphia, Pa.
- **BLAW-KNOX CO.**, Farmers Bank Bldg., Pittsburgh 22, Pa.
- **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee, Wis.
- **GEO. E. CHRISTOPHER & SON IRON WORKS**, 1220 Blaine, Wichita 1, Kans.
- **CONSTRUCTION MACHY. CO.**, P.O. Box 358, Waterloo, Iowa
- **QUINN WIRE & IRON WORKS**, Boone, Iowa

BIN GATES

- **ALLEN - SHERMAN - HOFF CO.**, Lewis Tower Bldg., Philadelphia 2, Pa.
- **AMERICAN MANGANESE STEEL DIV., AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
- **ANDERSON ENGINEERING CO.**, 237 Bent St., Cambridge 41, Mass.
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **THE C. O. BARTLETT AND SNOW CO.**, 6200 Harvard Ave., Cleveland 5, Ohio
- **BEAUMONT-BIRCH CO.**, 1505 Rose St., Philadelphia, Pa.
- **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **THE BRADY CONVEYORS CORP.**, 20 W. Jackson Blvd., Chicago 4, Ill.
- **L. BURMEISTER CO.**, 4539 W. Mitchell St., Milwaukee 14, Wis.
- **BUTLER BIN CO.**, Box 407, Waukesha, Wis.
- **CHAIN BELT CO.**, 1600 N. Bruce St., Milwaukee 4, Wis.
- **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.
- **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.
- **GEO. E. CHRISTOPHER & SON IRON WORKS**, 1220 Blaine, Wichita 1, Kans.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P.O. Box 673, Connellsville, Pa.
- **CONSTRUCTION MACHINERY CO.**, Glenwood & Vinton Sts., Waterloo, Iowa
- **DIAMOND IRON WORKS, INC.**, 1728 2nd St., No., Minneapolis 11, Minn.
- **DENVER EQUIPMENT CO.**, P.O. Box 5268, Denver 17, Colo.
- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
- **ERIE STEEL CONST. CO.**, Giest Road & N. P. R. R., Erie, Pa.
- **FULLER COMPANY**, Fuller Bldg., Catsaqua, Pa.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **GAR-BRO MFG. CO.**, 2416 E. 16th St., Los Angeles 21, Calif.
- **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.
- **GIFFORD-WOOD CO.**, 1 Hudson Ave., Hudson, N. Y.
- **GREENVILLE MFG. WORKS**, Greenville, Ohio

- **GRUENDLER CRUSHER & PULVERIZER CO.**, 2915-17th N. Market St., St. Louis, Mo.
- **HARDY SCALES CO.**, 5701 So. Atlantic Blvd., Maywood, Calif.
- **THE HELTZEL STEEL FORM AND IRON CO.**, 1750 Thomas Road, Warren, Ohio
- **ROBINS CONVEYORS DIV., HE-WITT-ROBINS, INC.**, 270 Passaic Ave., Passaic, N. J.
- **ROBERT HOLMES & BROS., INC.**, 3519 Junction Ave., Danville, Ill.
- **IOWA MFG. CO.**, 916 16th St., N. E., Cedar Rapids, Iowa
- **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
- **THE C. S. JOHNSON CO.**, P. O. Box 71, Champaign, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.
- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **MADSEN IRON WORKS, INC.**, 5631 Bickett St., Huntington Park, Calif.
- **MANGANESE STEEL FORGE CO.**, Richmond St. & Castor Ave., Philadelphia 34, Pa.
- **THE MARIETTA CONCRETE CORP.**, Westview, Box 356, Marietta, Ohio
- **E. F. MARSH ENG. CO.**, 4324 W. Clayton Ave., St. Louis 10, Mo.
- **MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.
- **MORSE BROS. MACHINERY CO.**, 2900 Brighton Blvd., Denver 1, Colo.
- **McLANAHAN AND STONE CORP.**, Hollidaysburg, Pa.
- **McNALLY - PITTSBURG MFG. CORP.**, Pittsburgh, Kans.
- **THE NEFF & FRY CO.**, 150 S. Main St., Camden, Ohio
- **NOBLE CO.**, 1860 Seventh St., Oakland 20, Calif.
- **PIONEER ENG. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
- **RICHARDSON SCALE CO.**, Van Houten Ave., Clifton, N. J.
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.
- **THE STANDARD METAL MFG. CO.**, Malinta, Ohio
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **STRAUB MFG. CO.**, 507 Chestnut St., Oakland 7, Calif.
- **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.
- **UNIVERSAL ENGINEERING CORP.**, 625 C Ave., N. W., Cedar Rapids, Iowa
- **WEBSTER MFG. INC.**, Tiffin 16, Ohio
- **WITTMANN MACHINERY CO.**, Paynters Road, Farmingdale, N. J.

BIN LEVEL INDICATORS

- **THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N. Y.
- **THE BIN-DICATOR CO.**, 13946 Kercheval Ave., Detroit 15, Mich.
- **BLAW-KNOX CO.**, Farmers Bank Bldg., Pittsburgh 22, Pa.
- **BUTLER BIN CO.**, Box 407, Waukesha, Wis.
- **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wis.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.

- **THE CONVEYOR CO. INC.**, 3260 E. Slauson Ave., Los Angeles 11, Calif.
- **ERIE STEEL CONST. CO.**, Giest Rd. and N.P.R.R., Erie, Pa.
- **FULLER COMPANY**, Fuller Bldg., Catsaqua, Pa.
- **IOWA MFG. CO.**, 916 16th St., N. E., Cedar Rapids, Iowa
- **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
- **THE C. S. JOHNSON CO.**, P. O. Box 71, Champaign, Ill.
- **MOSHER ELECTRONIC CONTROLS**, 25 Boston Post Rd., Larchmont, N. Y.
- **NOBLE CO.**, 1860 Seventh St., Oakland 20, Calif.
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **SYNTRON CO.**, 405 Lexington Ave., Homer City, Pa.

BINS AND BATCHING EQUIPMENT

- **ALPHA TANK & SHEET METAL CO.**, 5001 S. 38th St., St. Louis 16, Mo.
- **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio.
- **ANDERSON ENGINEERING CO.**, 237 Bent St., Cambridge 41, Mass.
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **BESSER MFG. CO.**, 205 47th St., Alhambra, Mich.
- **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
- **BONDED SCALE CO.**, 41 Bellview, Columbus 7, Ohio
- **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wis.
- **BUTLER BIN CO.**, Box 407, Waukesha, Wis.
- **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wis.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONSTRUCTION MACHINERY CO.**, Glenwood & Vinton Sts., Waterloo, Iowa
- **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.
- **DODSON MFG. CO. INC.**, 1463 Barwise, Wichita, Kans.
- **DRAYO CORP., ENGINEERING WKS. DIV.**, Neville Island, Pittsburgh 6, Pa.
- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
- **ERIE STEEL CONST. CO.**, Giest Road & N. P. R. R., Erie, Pa.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis, Mo.
- **GAR-BRO MFG. CO.**, 2416 E. 16th St., Los Angeles 21, Calif.
- **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.
- **GREENVILLE MFG. WORKS**, Greenville, Ohio
- **HARDY SCALES CO.**, 5701 So. Atlantic Blvd., Maywood, Calif.
- **THE HELTZEL STEEL FORM AND IRON CO.**, 1750 Thomas Road, Warren, Ohio
- **IOWA MFG. CO.**, 916 16th St., N. E., Cedar Rapids, Iowa
- **IRVINGTON FORM & TANK CORP.**, 20 Vesey St., New York 7, N. Y.
- **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
- **THE C. S. JOHNSON CO.**, P. O. Box 71, Champaign, Ill.
- **LANDIS STEEL CO.**, 116 W. A St., Picher, Okla.

- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **THE MARIETTA CONCRETE CORP.**, Westview, Box 356, Marietta, Ohio
- **MEYER SCALES, INC.**, 449 Central Ave., Orange, N. J.
- **THE NEFF & FRY CO.**, 150 S. Main St., Camden, Ohio
- **NOBLE CO.**, 1860 Seventh St., Oakland 20, Calif.
- **RICHARDSON SCALE CO.**, Van Houten Ave., Clifton, N. J.
- **WM. E. ROBINSON & CO.**, 3307 Spring Garden St., Philadelphia 4, Pa.
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **SINTERING MACHINERY CORP.**, Netcong, N. J.
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **WINSLOW GOVT. STANDARD SCALE WKS. INC.**, 25th and Haythorne Ave., Terre Haute, Ind.
- **WITTMANN MACHINERY CO.**, Paynters Road, Farmingdale, N. J.

BINS, STORAGE: CONCRETE (MONOLITHIC)

- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **GIFFORD-WOOD CO.**, 1 Hudson Ave., Hudson, N. Y.
- **GREENVILLE MFG. WORKS**, Greenville, Ohio
- **E. LEE HEIDENREICH, JR.**, 67 Second St., Newburg, N. Y.
- **THE HELTZEL STEEL FORM AND IRON CO.**, 1750 Thomas Road, Warren, Ohio
- **IRVINGTON FORM & TANK CORP.**, 20 Vesey St., New York 7, N. Y.
- **THE C. S. JOHNSON CO.**, P. O. Box 71, Champaign, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **THE NEFF & FRY CO.**, 150 S. Main St., Camden, Ohio
- **NICHOLSON CO.**, 10 Rockefeller Plaza, New York 20, N. Y.

BIN, STORAGE: CONCRETE (PRECAST)

- **CONCRETE SILO CO.**, P. O. Box 346, Bloomfield, Ind.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **GIFFORD-WOOD CO.**, 1 Hudson Ave., Hudson, N. Y.
- **THE MARIETTA CONCRETE CORP.**, Westview, Box 356, Marietta, Ohio
- **THE NEFF & FRY CO.**, 150 S. Main St., Camden, Ohio
- **NICHOLSON CO.**, 10 Rockefeller Plaza, New York 20, N. Y.

BINS, STORAGE: STEEL

- **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio
- **ALLIED WELDING & MFG. CO. INC.**, 49 Lorna Doone Blvd., Orlando, Fla.
- **ANDERSON ENGINEERING CO.**, 237 Bent St., Cambridge 41, Mass.
- **ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO. INC.**, 958 Wall St., Toledo 6, Ohio
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **BAUGHMAN MFG. CO. INC.**, Jerseyville, Ill.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

• **BESSER MFG. CO.**, 205 47th St., Alpena, Mich.

• **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
• **BIRMINGHAM TANK CO., DIV. OF INGALLS IRON WKS. CO.**, P. O. Drawer 1490, Birmingham 1, Ala.

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P. O. Box 1198, Pittsburgh 30, Pa.

• **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.

• **THE BRADY CONVEYORS CORP.**, 20 W. Jackson Blvd., Chicago 4, Ill.

• **BUTLER BIN CO.**, Box 407, Waukesha, Wisc.

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

• **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P. O. Box 673, Conneltsville, Pa.

• **CONSTRUCTION MACHINERY COS.**, Glenwood & Vinton Sts., Waterloo, Iowa

• **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

• **DIAMOND IRON WORKS, INC.**, 1728 2nd St., No., Minneapolis 11, Minn.

• **DRAGO CORP., ENGINEERING WKS. DIV.**, Neville Island, Pittsburgh 6, Pa.

• **GENERAL AMERICAN TRANSPORTATION CORP.**, Field Bldg., Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

• **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.

• **GRUENDLER CRUSHER & PULVERIZER CO.**, 2920 N. Market St., St. Louis 6, Mo.

• **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

• **GIFFORD-WOOD CO. & TANK CORP.**, 11 Hudson Ave., Hudson, N. Y.

• **GRAVER TANK & MFG. CO., INC.**, 4809 Tod Ave., East Chicago, Ind.

• **GREENVILLE MFG. WORKS**, Greenville, Ohio

• **HARDY SCALERS CO.**, 5701 So. Atlantic Blvd., Maywood, Calif.

• **THE HELTZEL STEEL FORM AND IRON CO.**, 1750 Thomas Road, Warren, Ohio

• **ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC.**, 270 Passaic Ave., Passaic, N. J.

• **ROBERT HOLMES & BROS., INC.**, 3519 Junction Ave., Danville, Ill.

• **THE INGALLS IRON WORKS CO.**, P. O. Drawer 2632, Birmingham 2, Ala.

• **IOWA MFG. CO.**, 916 16th St., N. E., Cedar Rapids, Iowa

• **IRVINGTON FORM & TANK CORP.**, 20 Vesey St., New York 7, N. Y.

• **ISAACSON IRON WORKS**, Box 3028, Seattle 14, Wash.

• **THE C. S. JOHNSON CO.**, P. O. Box 71, Champaign, Ill.

• **THE KIRK & BLUM MFG. CO.**, 2838 Spring Grove Ave., Cincinnati 25, Ohio

• **LANDIS STEEL CO.**, 116 W. A St., Picher, Okla.

• **LIPPMAHN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wisc.

• **LINK BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

• **MANITOWOC ENGINEERING WORKS**, Manitowoc, Wisc.

• **MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.

• **McDERMOTT BROS. CO.**, Ft. of Washington St., Allentown, Pa.

• **McNALLY - PITTSBURG MFG. CORP.**, Pittsburg, Kans.

• **MOBLE CO.**, 1860 Seventh St., Oakland 20, Calif.

• **PIONEER ENG. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.

• **REPUBLIC STEEL CORP.**, Republic Bldg., Cleveland 1, Ohio

• **RICHARDSON SCALE CO.**, Van Houten Ave., Clifton, N. J.

• **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.

• **SOUTHWEST WELDING & MFG. CO.**, 3201 W. Mission Road, Alhambra, Calif.

• **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

• **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.

• **UNIVERSAL ENGINEERING CORP.**, 625 C Ave., N. W., Cedar Rapids, Iowa

• **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N. Y.

• **VAN ORNUM CO.**, 344 Haddon Ave., Westmont, N. J.

• **WEBSTER MFG. INC.**, Tiffin 16, Ohio

BITS, Carbide Drill

• **CARBOLLOY CO., INC.**, 11177 E. Eight Mile Rd., Detroit 32, Mich.

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **KENAMETAL INC.**, Lloyd Ave., Latrobe, Pa.

• **ROCK BIT SALES & SERVICE CO.**, 2514 E. Cumberland St., Philadelphia 25, Pa.

• **SALEM TOOL CO.**, 700 S. Ellsworth St., Salem, Ohio

• **SANDVIK STEEL, INC.**, 111 Eighth Ave., New York 11, N. Y.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

BITS, Drill

• **BUCRYUS-ERIE CO.**, South Milwaukee, Wis.

• **CARBOLLOY CO., INC.**, 11177 E. Eight Mile Rd., Detroit 32, Mich.

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **THE LOOMIS MACHINE CO.**, 15 E. Market St., Tiffin, Ohio

• **ROCK BIT SALES & SERVICE CO.**, 2514 E. Cumberland St., Philadelphia 25, Pa.

• **SALEM TOOL CO.**, 700 S. Ellsworth St., Salem, Ohio

• **THE SANDERSON CYCLONE DRILL CO.**, 157 S. Main St., Orrville, Ohio

• **SCHRAMM INC.**, West Chester, Pa.

• **SPRAGUE & HENWOOD, INC.**, 221 W. Olive St., Scranton 2, Pa.

• **STAR DRILLING MACHINE CO.**, 474 Washington St., Akron 11, Ohio

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

• **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

BITS, Drill, Detachable

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **KENAMETAL INC.**, Lloyd Ave., Latrobe, Pa.

• **ROCK BIT SALES & SERVICE CO.**, 2514 E. Cumberland St., Philadelphia 25, Pa.

• **SALEM TOOL CO.**, 700 S. Ellsworth St., Salem, Ohio

• **SCHRAMM INC.**, West Chester, Pa.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

• **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

BITS, Drill, Grinders

• **CARBOLLOY CO., INC.**, 11177 E. Eight Mile Rd., Detroit 32, Mich.

• **INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **THE MINE & SMELTER SUPPLY CO.**, 1422 17th St., Denver 17, Colo.

• **MONTGOMERY & CO., INC.**, 53 Park Pl., New York 7, N. Y.

• **SANDVIK STEEL, INC.**, 111 Eighth Ave., New York 11, N. Y.

• **SCHRAMM INC.**, West Chester, Pa.

• **INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.

• **ISAACSON IRON WORKS**, Box 3028, Seattle 14, Wash.

• **THE LOOMIS MACHINE CO.**, 15 E. Market St., Tiffin, Ohio

• **McKIERNAN-TERRY CORP.**, 505 Manor Ave., Harrison, N. J.

• **AMERICAN CYANAMID CO.**, Explosives Dept., 30 Rockefeller Plaza, New York 20, N. Y.

• **AMERICAN WHEELABRATOR & EQUIP. CORP.**, 439 S. Byrkit St., Mishawaka, Ind.

• **ATLAS POWDER CO.**, Wilmington 99, Del.

• **E. I. du PONT de NEMOURS & CO., INC.**, Wilmington, Del.

• **HERCULES POWDER CO.**, 946 King St., Wilmington, Del.

• **ILLINOIS POWDER MFG. CO.**, 730 Pierce Bldg., St. Louis 2, Mo.

• **THE KING POWDER CO., INC.**, 1703—1st National Bank Bldg., Cincinnati 2, Ohio

• **THE MACLEOD CO.**, 2232-40 Bogen St., Cincinnati 22, Ohio

• **SALEM TOOL CO.**, 700 S. Ellsworth St., Salem, Ohio

• **THE SANDERSON CYCLONE DRILL CO.**, 157 S. Main St., Orrville, Ohio

• **SCHRAMM INC.**, West Chester, Pa.

• **SPRAGUE & HENWOOD, INC.**, 221 W. Olive St., Scranton 2, Pa.

• **STAR DRILLING MACHINE CO.**, 474 Washington St., Akron 11, Ohio

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

• **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

• **KORS-PETTIT WIRE FABRICS & IRON WORKS, INC.**, 1508-15 N. Mascher St., Philadelphia 22, Pa.

• **MILLER MANUFACTURING CO.**, Mills Bldg., P. O. Dr. 666, El Paso, Tex.

• **NATIONAL POWDER CO.**, Eldred, Pa.

• **TROJAN POWDER CO.**, 17 N. Seventh St., Allentown, Pa.

• **VIBRATION ENGINEERING CO.**, 131 N. Wyoming St., Hazleton, Pa.

BLOCK MACHINES, Concrete Building

1. Tamping
2. Vibrating

• **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio

1—2
• **ALLIED WELDING & MFG. CO., INC.**, 49 Lorna Doone Blvd., Orlando 2, Fla.

• **BERGEN MACHINE & TOOL CO., INC.**, 189 Franklin Ave., Nutley 10, N. J.

2
• **BESSER MFG. CO.**, Alpena, Mich.

1—2
• **BURKHARD BLOCKS INC.**, 316 Broad St., Waverly, N. Y.

1
• **CHASE CONCRETE MACHINERY CO.**, 1 Linwood Ave., Buffalo 2, N. Y.

2
• **GEO. C. CHRISTOPHER & SON IRON WORKS CO.**, 1220 Blaine, Wichita 1, Kans.

1
• **COLLINS EQUIPMENT & SUPPLY CO.**, 19 E. Jefferson St., Joliet, Ill.

1—2
• **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.

1
• **COLUMBIA MACHINE WORKS**, 107 S. Grand Ave., Vancouver, Wash.

1—2
• **ROY DARDEN INDUSTRIES, INC.**, P. O. Box 95, North Side Branch, Atlanta 3, Ga.

2
• **DES PLAINES CONCRETE PROD. MACHINERY**, 930 North Ave., Des Plaines, Ill.

1
• **DOMINE AUTOMATIC MACHINE CO.**, 155-225 Gould St., Rochester, N. Y.

1
• **W. E. DUHN MFG. CO.**, 550 W. 23rd St., Holland, Mich.

2
• **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis, Mo.

2
• **GENERAL ENGINES CO.**, 307 Hunter St., Gloucester, N. J.

2
• **F. C. GEORGE MACHINE CO., INC.**, 100 S. Westmoreland Dr., Orlando, Fla.

1—2
• **HYDRO-FORGED STONE ASSOCIATES, INC.**, 470 Bulkley Bldg., Cleveland 15, Ohio

1
• **JACKSON & CHURCH CO.**, 321 N. Hamilton Ave., Saginaw, Mich.

1—2
• **THE KENT MACHINE CO.**, 1931 Thomas St., Cuyahoga Falls, Ohio

1—2
• **LIFETIME BUILDING SPECIALTIES INC.**, 519 Brook Haven Dr., Orlando, Fla.

2
• **LITH-I-BAR CO.**, Holland, Mich.

1—2
• **THE MILES MFG. CO.**, P. O. Box 65, Jackson, Mich.

1
• **LESLIE C. MILLER SUPPLY INC.**, P. O. Box 7, Bedford, Ohio

1—2

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

MAGIC CONCRETE EQUIPMENT CO., 18 Woodland Ave., Winsted, Conn.

1-2
MISHCO CORP., 615 S. W 2nd Ave., Miami, Fla.

1-2
MORTARLESS TILE MACH. CO., INC., 2623 Riverside Dr., Los Angeles 39, Calif.

1-2
MULTIPLEX MACHINERY CORP., Elmore, Ohio

1-2
THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

2
OSWALT ENGINEERING SERVICE CORP., 1335 Circle Ave., Forest Park, Ill.

1
PRASCHAK MACHINE CO., Marshfield, Wisc.

1-2
SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.

2
STEARNS MFG. CO., INC., 600 E. Bencher St., Syracuse 6, N. Y.

1-2
SUPERIOR-LIDGERWOOD-MUNDY CORP., 7 Day St., New York 7, N. Y.

1
H. R. SUTTER CO., 661 Wyoming Ave., Buffalo, N. Y.

1
TWINPLEX HYDRAULICS, INC., 2507 James St., Syracuse 6, N. Y.

2
UNIVERSAL TAMPERS INC., 1530 N. Adams St., Peoria 3, Ill.

1-2
VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.

2
WITTMANN MACHINERY CO., Painters Road, Farmingdale, N. J.

1
C. M. WOOTEN CO., 2721 N. Central Ave., Knoxville 17, Tenn.

1-2
YELLEN HI-SPEED BLOCK MACHINE CO., 381 Jeffries St., Perth Amboy, N. J.

BLOCK MACHINE ACCESSORIES

BERGEN MACHINE & TOOL CO., INC., 189 Franklin St., Nutley 10, N. J.

● **BESSER MFG. CO.**, 205 47th St., Alpena, Mich.

● **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

GENERAL ENGINES CO., INC., 307 Hunter St., Gloucester, N. J.

HYDPO-FOGGED STONE ASSOCIATES, INC., 420 Bulkley Bldg., Cleveland 15, Ohio

● **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.

TEXAS FOUNDRIES, INC., P.O. Box 180, Lufkin, Texas

VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.

YELLEN HI-SPEED BLOCK MACHINE CO., 381 Jeffries St., Perth Amboy, N. J.

BLOCKS, Pillow, Ball and Roller Bearing

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BERGEN MACHINE & TOOL CO., INC., 189 Franklin St., Nutley 10, N. J.

● **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.

● **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wisc.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

● **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.

THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.

R. & J. DICK CO., INC., P. O. Box 388, Passaic, N. J.

DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Road, Niagara Falls, N. Y.

● **DODGE MANUFACTURING CORP.**, Mishawaka, Ind.

● **THE J. B. ENHANS & SONS MFG. CO.**, Enterprise, Kans.

THE FAFNIR BEARING CO., 37 Booth St., New Britain, Conn.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Donville, Ill.

W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.

● **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

M-NALLY PITTSBURGH MFG. CORP., Pittsburg, Kans.

THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.

SPOURT, WALDRON & CO., INC., Muncy, Pa.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

UNITED IRON WORKS CO., 109 No. Locust, Pittsburgh, Kans.

● **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.

THE CLEVELAND CHAIN & MFG. CO., 445 Henry St., Cleveland 5, Ohio

DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Road, Niagara Falls, N. Y.

DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

MADESCO TACKLE BLOCK CO., P. O. Box 148, Easton, Pa.

● **SAUERMAN BROS., INC.**, 530 S. Clinton St., Chicago 7, Ill.

THE UPSON-WALTON CO., Perry Payne Bldg., Cleveland 13, Ohio

● **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

BLOWERS, (see Fans and Blowers)

BLOW TORCHES, Heaters, Thawing Outfits for Frozen Aggregates

THE MACLEOD CO., 2232-40 Bogen St., Cincinnati 22, Ohio

HAUCK MFG. CO., 124-136 Tenth St., Brooklyn 15, N. Y.

MAHR MFG. CO., DIV. DIAMOND IRON WKS., 1728 2nd St. No., Minneapolis 11, Minn.

BOATS, Derrick, Tow

INCALLS SHIPBUILDING CORP., P. O. Drawer 2638, Birmingham 2, Ala.

MANITOWOC ENGINEERING WORKS, Manitowoc, Wisc.

BOATS, Self-Unloading

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

INGALLS SHIPBUILDING CORP., P.O. Drawer 2632, Birmingham 2, Ala.

MANITOWOC ENGINEERING WORKS, Manitowoc, Wisc.

● **SAUERMAN BROS., INC.**, 530 S. Clinton St., Chicago 7, Ill.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

BODIES, Ready Mixed Concrete

1. Transit Mixed
2. Non-Agitator

● **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

1
● **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wisc.

1
● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

1
● **CONSERCO CO.**, River Road & BGO R. R., Washington, D. C.

1
● **COOK BROS. EQUIPMENT CO.**, 1815 N. Broadway, Los Angeles 31, Calif.

● **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

● **DUMPCRETE DIV., MAXON CONSTRUCTION CO., INC.**, 131 N. Ludlow St., Dayton 2, Ohio

2
● **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

1
● **HERCULES STEEL PRODUCTS CORP.**, Sherman St., Galion, O.

● **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, O.

1
● **R. G. LeTOURNEAU, INC.**, 2301 N. Adams St., Peoria, Ill.

1
● **MIXERMOBILE MANUFACTURERS**, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.

1
● **THE T. L. SMITH CO.**, 2835 N. 32nd St., Milwaukee 45, Wisc.

1
● **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

1-2

BODIES, Detachable Concrete Truck

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

DUMPCRETE DIV., MAXON CONSTRUCTION CO., INC., 131 N. Ludlow St., Dayton 2, Ohio

BROOKS EQUIPMENT & MFG. CO., 408-10, Davenport Road, Knoxville 3, Tenn.

LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.

McCABE-POWERS AUTO BODY CO., 5900 N. Broadway, St. Louis 15, Mo.

BODIES, Dump, Dump Truck

ANTHONY COMPANY, Streator, Ill.

ATHEY PRODUCTS CO., 5631 W. 65th St., Chicago 38, Ill.

COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.

DEMPSTER BROTHERS, INC., Springdale St., Knoxville 17, Tenn.

EASTON CAR & CONSTRUCTION CO., Easton, Pa.

GALION ALL STEEL BODY CO., Galion, Ohio

GAR WOOD INDUSTRIES, INC., Wayne Div., Wayne, Mich.

FRUEHAUF TRAILER CO., Detroit 32, Mich.

THE HEIL CO., 3000 W. Montana St., Milwaukee 1, Wisc.

HERCULES STEEL PRODUCTS CORP., Sherman St., Galion, Ohio

KEWANEE MANUFACTURING CO., Department RP, Kewanee, Ill.

LANDIS STEEL CO., 116 W. A. St., Picher, Okla.

LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.

THE MARION METAL PRODUCTS CO., Cheney Ave. & Otis St., Marion, Ohio

McCABE-POWERS AUTO BODY CO., 5900 N. Broadway, St. Louis 15, Mo.

THE PERFECTION STEEL BODY CO., S. East St., Galion, Ohio

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.

TRUCK EQUIPMENT CO., INC., 1791 Fillmore Ave., Buffalo 14, N. Y.

WINCH-LIFT INC., 317 First National Bank, Shreveport, La.

BODIES, Trailer

ALLIED WELDING & MFG. CO., INC., 49 Lorna Doone Blvd., Orlando, Fla.

COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.

EASTON CAR & CONSTRUCTION CO., Easton, Pa.

FRUEHAUF TRAILER CO., Detroit 32, Mich.

GALION ALL STEEL BODY CO., Galion, Ohio

GAR WOOD INDUSTRIES, INC., Wayne Div., Wayne, Mich.

THE HEIL CO., 3000 W. Montana St., Milwaukee 1, Wisc.

HERCULES STEEL PRODUCTS CORP., Sherman St., Galion, O.

LANDIS STEEL CO., 116 W. A. St., Picher, Okla.

THE PERFECTION STEEL BODY CO., S. East St., Galion, Ohio

SCHONROCK EQUIPMENT MFG. CO., P.O. Box 1543, San Angelo, Texas

THE TRAILMOBILE CO., 31st and Robertson Aves., Cincinnati 19, Ohio

TRUCK EQUIPMENT CO., INC., 1791 Fillmore Ave., Buffalo 14, N. Y.

BODIES, Trailer, Bulk Cement

● **BAUGHMAN MFG. CO., INC.**, Jerseyville, Ill.

L. BURMEISTER CO., 4535 W. Mitchell St., Milwaukee 14, Wisc.

● **BUTLER BIN CO.**, Box 407, Waukesha, Wisc.

THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.

● A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.

EASTON CAR & CONSTRUCTION Co., Easton, Pa.

FRUEHAUF TRAILER CO., Detroit 32, Mich.

MERCURIES STEEL PRODUCTS CORP., Sherman St., Galion, O.
LANDIS STEEL CO., 116 W. A. St., Picher, Okla.

THE MARION METAL PRODUCTS CO., Cheney Ave. & Otis St., Marion, Ohio

MCABE-POWERS AUTO BODY CO., 5900 N. Broadway, St. Louis 15, Mo.

SCHONROCK EQUIPMENT MFG. CO., P.O. Box 1543, San Angelo, Texas

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.

THE TRAILMOBILE CO., 31st and Robertson Aves., Cincinnati 19, Ohio

TRUCK EQUIPMENT CO. INC., 1791 Fillmore Ave., Buffalo 14, N. Y.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburgh, Kans.

WINCH-LIFT INC., 317 First National Bank, Shreveport, La.

BOILER ACCESSORIES

THE HAYS CORP., East 8th St., Michigan City, Ind.

MANNING, MAXWELL & MOORE, INC., 11 Elias St., Bridgeport 2, Conn.

JOSEPH T. RYERSON & SON, INC., 2558 West 16th St., Chicago 80, Ill.

STAPLES & PEIFFER, 528 Bryant St., San Francisco 7, Calif.

BOILER FEED WATER SYSTEMS

CYCLOTHERM CORP., 157 East 1st St., Oswego, N. Y.

THE DORR CO. INC., Barry Pl., Stamford, Conn.

BOILER INSULATION

AMERICAN VERMICULITE CORP., 654 Madison Ave., New York 21, N. Y.

THE BARCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

CHICAGO FIRE BRICK CO., 1467 Elston Ave., Chicago 22, Ill.

THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.

A. P. GREEN FIRE BRICK CO., 1018 E. Breckenridge, Mexico, Mo.

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N. Y.

MEXICO REFRACTORIES CO., Better Refractories Bldg., Mexico, Mo.

QUICKLEY COMPANY, INC., 527 Fifth Ave., New York 17, N. Y.

THE RUBBEROID CO., 500 Fifth Ave., New York 18, N. Y.

BOILER TUBES

THE BARCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave., S.E., Minneapolis 14, Minn.

REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio

JOSEPH T. RYERSON & SON, INC., 2558 West 16th St., Chicago 80, Ill.

BOILERS

THE BARCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S. E., Minneapolis 14, Minn.

CLEAVER-BROOKS CO., 326 E. Keefe Ave., Milwaukee 12, Wis.

CYCLOTHERM CORP., 157 East 1st St., Oswego, N. Y.

THE DORR CO., 570 Lexington Ave., New York 22, N. Y.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

MANITOWOC ENGINEERING WORKS, Manitowoc, Wisc.

STRUTHERS WELLS CORP., Pennsylvania Ave., Warren, Pa.

WICKES BOILER CO., 519 N. Washington St., Saginaw, Mich.

BOILERS, Waste Heat

THE BARCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S. E., Minneapolis 14, Minn.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

STRUTHERS WELLS CORP., Pennsylvania Ave., Warren, Pa.

WICKES BOILER CO., 519 N. Washington St., Saginaw, Mich.

BOOSTERS, Voltage, Motor Generator

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

BRAKE LINING

THE FIRESTONE TIRE & RUBBER CO., 1200 Firestone Pkwy., Akron 17, Ohio

FRUEHAUF TRAILER CO., Detroit 32, Mich.

GREY-ROCK DIV. RAYBESTOS-MANHATTAN, INC., Mannheim, Pa.

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N. Y.

THE RAYBESTOS DIV. RAYBESTOS-MANHATTAN, INC., Stratford, Conn.

RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.

SCANDINAVIA BELTING CO., 250 Central Ave., Newark 1, N. J.

THERMOID COMPANY, Trenton, N. J.

WAGNER ELECTRIC CORP., 6400 Plymouth Ave., St. Louis 14, Mo.

THE S. K. WELLMAN CO., 1374 E. 51st St., Cleveland 3, Ohio

BRAKES

1. Clutch
2. Hydraulic
3. Magnetic

BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

STEARNS MAGNETIC MFG. CO., 675 S. 28th St., Milwaukee 46, Wisc.

WAGNER ELECTRIC CORP., 6400 Plymouth Ave., St. Louis 14, Mo.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

BRICK, Refractory, Fire, (see Refractories)

BRICK MACHINES AND MOLDS

1. Concrete
2. Sand-Lime

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

BESSER MFG. CO., Alpena, Mich.

BERGEN MACHINE & TOOL CO., INC., 189 Franklin St., Nutley 10, N. J.

CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.

COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.

COLUMBIA MACHINE WORKS, 107 S. Grand Ave., Vancouver, Wash.

ROY DARDEN INDUSTRIES, INC., P. O. Box 95, North Side Branch, Atlanta 3, Ga.

W. E. DUNN MFG. CO., 550 W. 23rd St., Holland, Mich.

FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo.

GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J.

JACKSON & CHURCH CO., 321 N. Hamilton St., Saginaw 65, Mich.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

LESLIE K. MILLER SUPPLY INC., P. O. Box 7, Bedford, Ohio

MULTIPLEX MACHINERY CORP., Elmore, Ohio

THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

W. A. RIDDELL CORP., Bucyrus, Ohio

SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.

STEARNS MFG. CO., INC., 600 E. Beecher St., Adrian, Mich.

WITTEMANN MACHINERY CO., Paynters Road, Farmingdale, N. J.

BUCKET LOADERS

AUSTIN-WESTERN CO., Aurora, Ill.

BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.

BEAUMONT-BIRCH CO., 1505 Race St., Philadelphia, Penna.

CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wisc.

CHICAGO STEEL FOUNDRY CO., Kedzie Ave. and 37th St., Chicago 32, Ill.

EAGLE CRUSHER CO., INC., 900 Harding Way E., Galion, Ohio

THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah

GENERAL CONVEYOR & MFG. CO., 3601 Salento St., St. Louis 18, Mo.

GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.

THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.

ISAACSON IRON WORKS, Box 3028, Seattle 14, Wash.

LIPPMAN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wisc.

LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.

MAINE STEEL INC., South Windham, Me.

MIXERMOBILE MANUFACTURERS, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.

OTTAWA STEEL PRODUCTS CO., Ottawa, Kansas

OWEN BUCKET CO., 6001 Breakwater Ave., Cleveland 2, Ohio

PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.

SHEPPARD DIESELS, Philadelphia St., Hanover, Pa.

TRACKSON COMPANY, 3333 S. Chase Ave., Milwaukee 7, Wis.

TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill.

TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.

WESTERN MACHINERY CO., 760-765 Folsom St., San Francisco 7, Calif.

WEBSTER MFG. INC., Tiffin 16, Ohio

BUCKET LIPS & TEETH

ALLIED STEEL PRODUCTS, INC., 7835 Broadway, Cleveland 5, O.

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.

BLAW-KNOX DIV. OF BLAW-KNOX CO., P.O. Box 1198, Pittsburgh 30, Pa.

BUCYRUS-ERIE CO., South Milwaukee, Wisc.

CHICAGO STEEL FOUNDRY CO., 3720 So. Kedzie Ave., Chicago 32, Ill.

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

FARRELL-CHEEK STEEL CO., Sandusky, Ohio

THE FROG, SWITCH & MFG. CO., Carlisle, Pa.

GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.

ISAACSON IRON WORKS, Box 3028, Seattle 14, Wash.

THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.

LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.

KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.

MANGANESE STEEL FORCE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

OWEN BUCKET CO., 6001 Breakwater Ave., Cleveland 2, Ohio

STROM PROCESS STEEL CO., 1428 High St., Pittsburgh 12, Pa.

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

UNITED IRON WORKS CO., 108 N. Locust, Pittsburgh, Kans.

WESTERN MACHINERY CO., 760-765 Folsom St., San Francisco 7, Calif.

YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

YAUM WELDING & DRAGLINE BUCKETS, INC., P.O. Box 1508, Baton Rouge, La.

BUCKETS

1. Clamshell & Orange Peel
2. Dragline & Slackline
3. Dredge & Excavator
4. Elevator
5. Grapple
6. Skip
7. Tramway
8. Tractor Loader

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

• **ALLIS-CHALMERS MFG. CO.,** TRACTOR DIV., P.O. Box 512, Milwaukee 1, Wis.

• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.,** 377 E. 14th St., Chicago Heights, Ill.

• **AMERICAN STEEL DREDGE CO., INC.,** 2511 Taylor St., Fort Wayne 6, Ind.

• **AUSTIN-WESTERN CO.,** Aurora, Ill.

• **BAER STEEL PRODUCTS, INC.,** P.O. Box 497, Auburn, Wash.

• **THE C. O. BARTLETT AND SNOW CO.,** 6200 Harvard Ave., Cleveland 5, Ohio

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.,** P.O. Box 1198, Pittsburgh 30, Pa.

• **BAY CITY SHOVELS, INC.,** Bay City, Mich.

• **BODINSON MFG. CO.,** 2401 Bayshore Blvd., San Francisco 24, Calif.

• **THE BRADY CONVEYORS, CORP.,** 20 W. Jackson Blvd., Chicago 4, Ill.

• **BUCHYRUS-ERIE CO.,** South Milwaukee, Wis.

• **L. BURMEISTER CO.,** 4539 W. Mitchell St., Milwaukee 14, Wis.

• **CHAIN BELT CO.,** 1600 W. Bruce St., Milwaukee 4, Wis.

• **CONTINENTAL GIN CO.,** P. O. Box 2614, Birmingham, Ala.

• **CONNELLSVILLE MFG. & MINE SUPPLY CO.,** P.O. Box 673, Connellsville, Pa.

• **COYLE & ROTH,** 3024 4th St. S. E., Minneapolis 14, Minn.

• **EROY DARDEN INDUSTRIES, INC.,** Box 95, Northside Sta., Atlanta, Ga.

• **DENVER EQUIPMENT CO.,** 1400 17th St., Denver, Colo.

• **DEMPTER BROTHERS, INC.,** Springdale St., Knoxville 17, Tenn.

• **DIAMOND IRON WORKS, INC.,** 1728 N. 2nd St., Minneapolis 11, Minn.

• **DROTT MFG. CORP.,** 3841 W. Wisconsin Ave., Milwaukee 8, Wis.

• **THE EIMCO CORP.,** P.O. Box 300, Salt Lake City 10, Utah

• **THE J. B. EHRSAM & SONS MFG. CO.,** Enterprise, Kans.

• **ELECTRIC STEEL FOUNDRY CO.,** 2141 N. W. 25th Ave., Portland 10, Ore.

• **ERIE STEEL CONST. CO.,** Giest Road & N. P. R. R., Erie, Pa.

• **FLEMING MFG. CO., INC.,** 4985 Fyler Ave., St. Louis 9, Mo.

• **THE FROG, SWITCH & MFG. CO.,** Carlisle, Pa.

• **GAR-BRO MFG. CO.,** 2416 E. 16th St., Los Angeles 21, Calif.

• **GENERAL CONVEYOR & MFG. CO.,** 3601 Salena St., St. Louis 18, Mo.

• **GEORGE HAISS MFG. CO.,** Park Ave. & 143rd St., New York 51, N. Y.

• **GIFFORD-WOOD CO.,** 1 Hudson Ave., Hudson, N. Y.

• **GRUENDLER CRUSHER & PULVERIZER CO.,** 2915-17 N. Market St., St. Louis, Mo.

• **THE HAYWARD CO.,** 202-204 Fulton St., New York, N. Y.

• **THE HELTZEL STEEL FORM AND IRON CO.,** 1750 Thomas Road, Warren, Ohio

• **HENDRIX MFG. CO.,** P. O. Box 31, Mansfield, La.

• **ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC.,** 270 Passaic Ave., Passaic, N. J.

• **ROBERT HOLMES & BROS., INC.,** 3519 Junction Ave., Danville, Ill.

• **THE FRANK G. HOUGH CO.,** Sunnyside Ave., Libertyville, Ill.

• **INSLEY MFG. CORP.,** 801 N. 2nd, Indianapolis 1, Ind.

• **ISAACSON IRON WORKS,** Box 3028, Seattle 14, Wash.

• **THE JEFFREY MFG. CO.,** 935 N. 4th St., Columbus 16, Ohio

• **THE C. S. JOHNSON CO.,** P. O. Box 71, Champaign, Ill.

• **FRANK A. KREMER & SONS, INC.,** 3435-45 N. 5th St., Philadelphia 40, Pa.

• **LANDIS STEEL CO.,** 116 W. A St., Picher, Okla.

• **LINK-BELT CO.,** 300 W. Pershing Road, Chicago 9, Ill.

• **LINK-BELT SPEEDER CORP.,** 1201 Sixth St. S.W., Cedar Rapids, Iowa

• **LUKENS STEEL CO.,** 521 Lukens Bldg., Coatesville, Pa.

• **LULL MFG. CO.,** 3612 E. 44th St., Minneapolis 6, Minn.

• **MANGANESE STEEL FORGE CO.,** Richmond St. & Castor Ave., Philadelphia 34, Pa.

• **M. P. McCAFFREY, INC.,** 2121 East 25th St., Los Angeles 11, Calif.

• **McDERMOTT BROS. CO.,** Ft. of Washington St., Allentown, Pa.

• **McKIERAN-TERRY CORP.,** 505 Monier Ave., Harrison, N. J.

• **MENALLY PITTSBURGH MFG. CORP.,** Pittsburgh, Kans.

• **ORTON CRANE & SHOVEL CO.,** 608 S. Dearborn St., Chicago 5, Ill.

• **OWEN BUCKET CO.,** 6001 Breakwater Ave., Cleveland 2, Ohio

• **PAGE ENGINEERING CO.,** Clearing P. O. Chicago 38, Ill.

• **PETTIBONE MULLIKEN CORP.,** 4710 W. Division St., Chicago 51, Ill.

• **"QUICK-WAY" TRUCK SHOVEL CO.,** 2401 E. 40th Ave., Denver 5, Colo.

• **SAUERMAN BROS., INC.,** 530 S. Clinton St., Chicago 7, Ill.

• **SHEPPARD DIESELS,** Philadelphia St., Hanover, Pa.

• **SMITH ENGINEERING WORKS,** 532 E. Capitol Dr., Milwaukee 12, Wis.

• **THE STANDARD METAL MFG. CO.,** Malinta, Ohio

• **STEPHENS-ADAMSON MFG. CO.,** 7 Ridgeway Ave., Aurora, Ill.

• **TAYLOR-WHARTON IRON & STEEL CO.,** High Bridge, N. J.

• **TRACKSON COMPANY,** 3333 S. Chase Ave., Milwaukee 7, Wis.

• **TRIANGLE ENGINEERING CO.,** 2848 W. 26th St., Chicago 23, Ill.

• **UNITED IRON WORKS CO.,** 108 N. Locust, Pittsburg, Kans.

• **WAYNE CRANE DIV. AMERICAN STEEL DREDGE CO., INC.,** P. O. Box 570, Fort Wayne 1, Ind.

• **WEBSTER MFG. INC.,** Tiffin 16, Ohio

• **THE WELLMAN ENGINEERING CO.,** 7000 Central Ave., Cleveland 5, Ohio

• **WESTERN MACHINERY CO.,** 750-766 Folsom St., San Francisco 7, Calif.

• **YUBA MFG. CO.,** 351 California St., San Francisco 4, Calif.

• **YAUM WELDING & DRAGLINE BUCKETS, INC.,** P.O. Box 1508, Baton Rouge, La.

• **BUILDINGS, Industrial, all Steel**

• **BETHLEHEM STEEL CO.,** E. Third St., Bethlehem, Pa.

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.,** P.O. Box 1198, Pittsburgh 30, Pa.

• **THE H. K. FERGUSON CO.,** Ferguson Building, Cleveland 14, O.

• **THE INCALLS IRON WORKS CO.,** P. O. Drawer 2632, Birmingham 2, Ala.

• **ISAACSON IRON WORKS,** Box 3028, Seattle 14, Wash.

• **REPUBLIC STEEL CORP.,** Republic Bldg., Cleveland 1, Ohio

• **TRUSCON STEEL CO.,** Albert St., Youngstown 1, Ohio

• **BULK CEMENT HANDLING EQUIPMENT**

• **THE C. O. BARTLETT AND SNOW CO.,** 6200 Harvard Ave., Cleveland 5, Ohio

• **BAUGHMAN MFG. CO., INC.,** Jerseyville, Ill.

• **BEAUMONT-BIRCH CO.,** 1505 Roe St., Philadelphia, Penna.

• **BODINSON MFG. CO.,** 2401 Bayshore Blvd., San Francisco 24, Calif.

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.,** P.O. Box 1198, Pittsburgh 30, Pa.

• **BONDED SCALE CO.,** 2166 S. 3rd St., Columbus, Ohio

• **THE BRADY CONVEYORS CORP.,** 20 W. Jackson Blvd., Chicago 4, Ill.

• **L. BURMEISTER CO.,** 4535 W. Mitchell St., Milwaukee 14, Wis.

• **BUTLER BIN CO.,** Box 407, Waukesha, Wis.

• **CONCRETE TRANSPORT MIXER CO.,** 4985 Fyler Ave., St. Louis 9, Mo.

• **CONSTRUCTION MACHINERY CO.,** Glenwood and Vinton Sts., Waterloo, Iowa

• **CONTINENTAL GIN CO.,** P. O. Box 2614, Birmingham, Ala.

• **THE CONVEYOR CO.,** 3260 East Stauson Ave., Los Angeles 11, Calif.

• **DRAYO CORPORATION,** Neville Island, Pittsburgh, Penna.

• **THE J. B. EHRSAM & SONS MFG. CO.,** Enterprise, Kans.

• **ERIE STEEL CONST. CO.,** Giest Rd. and N.P.R.R., Erie, Penna.

• **FLEMING MFG. CO.,** 4985 Fyler Ave., St. Louis 9, Mo.

• **FULLER COMPANY,** Fuller Bldg., Catasauqua, Pa.

• **GAR-BRO. MFG. CO.,** 2416 E. 16th St., Los Angeles 21, Calif.

• **GENERAL CONVEYOR & MFG. CO.,** 3601 Salena St., St. Louis 18, Mo.

• **HARDY SCALES CO.,** 5701 So. Atlantic Blvd., Maywood, Calif.

• **THE HELTZEL STEEL FORM AND IRON CO.,** 1750 Thomas Road, Warren, Ohio

• **ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC.,** 270 Passaic Ave., Passaic, N. J.

• **THE FRANK G. HOUGH CO.,** Sunnyside Ave., Libertyville, Ill.

• **THE C. S. JOHNSON CO.,** P.O. Box 71, Champaign, Ill.

• **THE JEFFREY MFG. CO.,** 935 N. 4th St., Columbus 16, Ohio

• **KENNEDY VAN SAUN MFG. & ENG. CORP.,** 2 Park Ave., New York 16, N. Y.

• **THE KENT MACHINE CO.,** 113 E. Portage Trail, Cuyahoga Falls, Ohio

• **LIPPIMANN ENGINEERING WORKS,** 4603 W. Mitchell St., Milwaukee 14, Wis.

• **NORCO CO.,** 1850 Seventh St., Oakland 20, Calif.

• **SAUERMAN BROS., INC.,** 530 S. Clinton St., Chicago 7, Ill.

• **STEPHENS-ADAMSON MFG. CO.,** 7 Ridgeway Ave., Aurora, Ill.

• **WEBSTER MFG. INC.,** Tiffin 16, Ohio

• **BULK CEMENT STORAGE PLANTS**

• **ALPHA TANK & SHEET METAL MFG. CO.,** 5007 S. 38th St., St. Louis 16, Mo.

• **BEAUMONT-BIRCH CO.,** 1503 Roe St., Philadelphia, Penna.

• **BETHLEHEM STEEL CO.,** E. 3rd St., Bethlehem, Pa.

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.,** P.O. Box 1198, Pittsburgh 30, Pa.

• **BODINSON MFG. CO.,** 2401 Bayshore Blvd., San Francisco 24, Calif.

• **BONDED SCALE CO.,** 2166 S. 3rd St., Columbus, Ohio

• **BUTLER BIN CO.,** Box 407, Waukesha, Wis.

• **CONCRETE TRANSPORT MIXER CO.,** 4985 Fyler Ave., St. Louis 9, Mo.

• **CONSTRUCTION MACHINERY CO.,** Glenwood & Vinton Sts., Waterloo, Iowa

• **THE CONVEYOR CO.,** 3260 East Stauson Ave., Los Angeles 11, Calif.

• **ERIE STEEL CONST. CO.,** Giest Road & N. P. R. R., Erie, Pa.

• **FLEMING MFG. CO.,** 4985 Fyler Ave., St. Louis 9, Mo.

• **GENERAL CONVEYOR & MFG. CO.,** 3601 Salena St., St. Louis 18, Mo.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

- THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
- THE MARIETTA CONCRETE CORP., Westview, Box 356, Marietta, Ohio
- NOBLE CO., 1860 Seventh St., Oakland 20, Calif.
- ROBINSON AIR-ACTUATED CONVEYOR SYSTEMS, 205 E. 42nd St., New York 17, N. Y.
- WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.
- SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill.
- STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

BULLDOZERS, Land Clearing Equipment

- ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.
- ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION, P. O. Box 512, Milwaukee 1, Wisc.
- AUSTIN-WESTERN CO., Aurora, Ill.
- THE BAKER MFG. CO., 10th and Stanford, Springfield, Ill.
- WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S. E., Minneapolis 14, Minn.
- BUCYRUS-ERIE CO., South Milwaukee, Wisc.
- CATERPILLAR TRACTOR CO., Peoria 8, Ill.
- CONSTRUCTION PRODUCTS CORP., 410 San Fernando Road, Los Angeles 31, Calif.
- DEMPSTER BROTHERS, INC., Springdale St., Knoxville 17, Tenn.
- DROTT MFG. CORP., 3841 W. Wisconsin Ave., Milwaukee 8, Wisc.
- THE HEIL CO., 3000 W. Montana St., Milwaukee 1, Wisc.
- LAPLANT-CHOATE MFG. CO., INC., 2920 1st Ave. N.E., Cedar Rapids, Iowa
- THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.
- ISAACSON IRON WKS., Box 3028, Seattle, Wash.
- R. G. LeTOURNEAU, INC., 2301 N. Adams St., Peoria, Ill.
- LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.
- M-R-S MANUFACTURING CO., P. O. Box 336, Flora, Miss.
- MAINE STEEL INC., South Windham, Me.
- THE OLIVER CORP., INDUSTRIAL DIV., 19300 Euclid Ave., Cleveland 17, Ohio
- SHEPPARD DIESELS, Philadelphia St., Hanover, Pa.
- SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.
- TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.
- WESTERN MACHINERY CO., 760-765 Folsom St., San Francisco 7, Calif.
- WOODBRIDGE MANUFACTURING CO., Sunnyvale, Calif.

BURNERS, Kiln

- ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.
- COMBUSTION EQUIPMENT DIV., TODD SHIPYARDS CORP., 81-16 45th Ave., Elmhurst, Queens, N. Y.
- THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.
- ELECTRO-ALLOYS DIV., AMERICAN BRAKE SHOE CO., Taylor St. & Abbey Road, Elyria, Ohio
- HAUCK MFG. CO., 124-136 10th St., Brooklyn 15, N. Y.

- KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
- JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.
- THE MACLEOD CO., 2232-40 Bogen St., Cincinnati 22, Ohio
- F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
- STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

BURNERS, OIL, (see Oil Burners)

C

CABLE, Electric

- AMERICAN STEEL & WIRE CO., Rockefeller Bldg., Cleveland 13, Ohio
- ANACONDA WIRE & CABLE CO., 25 Broadway, New York 4, N. Y.
- GENERAL CABLE CORP., 420 Lexington Ave., New York 17, N. Y.
- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
- ROCKBESTOS PRODUCTS CORP., Nicoll St., New Haven 4, Conn.
- JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.
- SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.
- UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.
- WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

CABLE, ELECTRIC, ACCESSORIES, Connectors, Etc.

- ALBERT & J. M. ANDERSON MFG. CO., 289-305 A St., Boston 10, Mass.
- ANACONDA WIRE & CABLE CO., 25 Broadway, New York 4, N. Y.
- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
- JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
- WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

CABLE EXCAVATORS

- ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION, P.O. Box 512, Milwaukee 1, Wisc.
- AUSTIN-WESTERN CO., Aurora, Ill.
- BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.
- BRAMMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.
- BUCYRUS-ERIE CO., South Milwaukee, Wisc.
- HARNISCHFGER CORP., 4400 W. National Ave., Milwaukee 14, Wisc.
- INGERSOLL - RAND CO., 11 Broadway, New York 4, N. Y.
- TRACKSON COMPANY, 3333 S. Chase Ave., Milwaukee 7, Wisc.
- JONES & LAUGHLIN STEEL CORP., Third Ave. & Ross St., Pittsburgh 30, Pa.
- NORTHWEST ENGINEERING CO., 135 S. La Salle St., Chicago 3, Ill.
- ROGERS IRON WORKS CO., 11th & Pearl St., Joplin, Mo.
- SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill.

- UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14, Wisc.

CABLEWAYS

- ATLAS CORPORATION, Mountville, Pa.
- BUCYRUS-ERIE CO., South Milwaukee, Wisc.
- JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.
- SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill.
- SUPERIOR - LIDGERWOOD - MUNDY CORP., Superior, Wisc.
- INTERSTATE EQUIPMENT DIV., YARA ENGINEERING CORP., 18 W. Jersey St., Elizabeth 4, N. J.

CALCIUM CHLORIDE

- THE DOW CHEMICAL CO., Midland, Mich.
- PITTSBURGH PLATE GLASS CO., COLUMBIA CHEMICAL DIV., Fifth Ave. at Bellefield, Pittsburgh 13, Pa.
- SOLVAY SALES DIV., ALLIED CHEMICAL & DYE CORP., 40 Rector St., New York 6, N. Y.
- TAMMS INDUSTRIES, INC., 228 No. La Salle St., Chicago 1, Ill.
- WYANDOTTE CHEMICALS CORP., MICHIGAN ALKALI DIV., Wyandotte, Mich.

CAPSTANS & WINCHES

- ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION, P. O. Box 512, Milwaukee 1, Wisc.
- AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.
- ATLAS CORPORATION, Mountville, Pa.
- THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
- C. H. & E. MFG. CO., 3840 N. Palmer St., Milwaukee 12, Wisc.
- CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.
- CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.
- DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Road, Niagara Falls, N. Y.
- DOWNES CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.
- CAR WOOD INDUSTRIES, INC., Wayne Div., Wayne, Mich.
- THE J. B. EHRMAN & SONS MFG. CO., Enterprise, Kans.
- FUEMMAIR TRAILER CO., Detroit 32, Mich.
- HENNEUSE ENGINEERING CO., Marion, Ohio
- HYSTER CO., 7918 N.E. Clackamas, Portland 8, Ore.
- ISAACSON IRON WKS., Box 3028, Seattle, Wash.
- LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
- McKERNAN-TERRY CORP., 505 Monor Ave., Harrison, N. J.
- SHEPARD NILES CRANE & HOIST CORP., Schuyler Ave., Montclair Falls, N. Y.
- SILENT HOIST & CRANE CO., 841 63rd St., Brooklyn 20, N. Y.
- STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
- SUPERIOR - LIDGERWOOD - MUNDY CORP., 7 Day St., New York 7, N. Y.
- SUPERIOR - LIDGERWOOD - MUNDY CORP., Superior, Wisc.
- TULSA WINCH DIV. OF VICKERS, INC., 815 E. 1st St., Tulsa 3, Okla.
- UNITED IRON WORKS CO., 108 N. Locust, Pittsburg, Kans.

- WEBSTER MFG. INC., Tiffin 16, Ohio
- THE YALE & TOWNE MFG. CO., Philadelphia 15, Pa.
- YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

CAR COUPLINGS, WHEELS & LINERS

- ATLAS CAR & MFG. CO., 1100 Ivanhoe Rd., Cleveland 10, Ohio
- PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.

CAR DUMPERS

- CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.
- DIFFERENTIAL STEEL CAR CO., Findlay, Ohio
- ELWELL-PARKER ELECTRIC CO., 4205 St. Clair Ave., Cleveland 8, Ohio
- ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
- LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
- McKERNAN-TERRY CORP., 505 Monor Ave., Harrison, N. J.
- THE NOLAN CO., Bowerston, O.
- PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.
- UNITED IRON WORKS CO., 108 N. Locust, Pittsburg, Kans.
- THE WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 5, Ohio

CAR LOADERS (see Loaders, Car)

CAR MOVERS, Pullers

- ADVANCE CAR-MOVER CO., 112 N. Outagamie St., Appleton, Wisc.
- ALLIS-CHALMERS MFG. CO., 1140 Ivanhoe Rd., Cleveland 10, Ohio
- AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.
- ARMSTRONG-BRAY & CO., 5364 Northwest Highway, Chicago 30, Ill.
- ATLAS CORPORATION, Mountville, Pa.
- THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
- BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
- CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.
- ROY DARDEN INDUSTRIES, INC., Box 95, Northside Sta., Atlanta, Ga.
- DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.
- DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Rd., Niagara Falls, N. Y.
- THE J. B. EHRMAN & SONS MFG. CO., Enterprise, Kans.
- GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
- HENNEUSE ENGINEERING CO., Marion, Ohio
- ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
- THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.
- INDUSTRIAL PRODUCTS CO., 2305 N. Fourth St., Philadelphia 33, Pa.
- THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
- W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.
- JOY MFG. CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

KEWANE MANUFACTURING CO., Department RP, Kewanee, Ill.

- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
- **LULL MFG. CO.**, 3612 E. 44th St., Minneapolis 6, Minn.
- **McKERNAN-TERRY CORP.**, 505 Manor Ave., Harrison, N. J.
- **SILENT HOIST & CRANE CO.**, 841 63rd St., Brooklyn 20, N. Y.
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **SUPERIOR LIDGERWOOD-MUNDY CORP.**, 7 Day St., New York 7, N. Y.
- **SUPERIOR LIDGERWOOD-MUNDY CORP.**, Superior, Wis.
- **UNITED IRON WORKS CO.**, 108 N. Locust, Pittsburg, Kans.
- **WEBSTER MFG. INC.**, Tiffin 16, Ohio
- **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

CAR SHAKERS

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **BERGEN MACHINE & TOOL CO., INC.**, 189 Franklin St., Nutley 10, N. J.
- **ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC.**, 270 Passaic Ave., Passaic, N. J.
- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
- **NATIONAL CONVEYOR & SUPPLY CO.**, 350 N. Harding Ave., Chicago 24, Ill.
- **NEW HAVEN VIBRATOR CO.**, 145 Chestnut St., New Haven 7, Conn.
- **WEBSTER MFG. INC.**, Tiffin 16, Ohio

CARS, Concrete Products

- **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
- **KWIK-MIX COMPANY**, 235 W. Grand Ave., Port Washington, Wis.
- **MULTIPLYX MACHINERY CORP.**, Elmore, Ohio
- **PRESSED STEEL CAR CO., INC.**, 25 Broad St., New York 4, N. Y.

CARS, Dump

- **ATLAS CAR & MFG. CO.**, 1100 Ivanhoe Rd., Cleveland 10, Ohio
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- **THE CHASE FOUNDRY & MFG. CO.**, 2300 S. Parsons Ave., Columbus 7, Ohio
- **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P.O. Box 673, Connelville, Pa.
- **DIFFERENTIAL STEEL CAR CO.**, Findlay, Ohio
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
- **ISAACSON IRON WORKS**, Box 3028, Seattle 14, Wash.
- **PRESSED STEEL CAR CO., INC.**, 25 Broad St., New York 4, N. Y.
- **UNITED IRON WORKS CO.**, 108 N. Locust, Pittsburg, Kans.

CARS, Electric, Remote Control

- **DIFFERENTIAL STEEL CAR CO.**, Findlay, Ohio
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

CARS, Mine, Quarry, Industrial

- **ATLAS CAR & MFG. CO.**, 1100 Ivanhoe Rd., Cleveland 10, Ohio
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **BAKER INDUSTRIAL TRUCK DIV., THE BAKER-RAULANG CO.**, 1250 W. 80th St., Cleveland 2, Ohio
- **THE C. O. BARTLETT AND SNOW CO.**, 6200 Harvard Ave., Cleveland 5, Ohio
- **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- **THE CHASE FOUNDRY & MFG. CO.**, 2300 S. Parsons Ave., Columbus 7, Ohio
- **COMMERCIAL METALS CO.**, Latimer at Corinth St., Dallas, Texas
- **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P.O. Box 673, Connelville, Pa.
- **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
- **DIFFERENTIAL STEEL CAR CO.**, Findlay, Ohio
- **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
- **ISAACSON IRON WORKS**, Box 3028, Seattle 14, Wash.
- **LANDIS STEEL CO.**, 116 W. A. St., Picher, Okla.
- **MADSEN IRON WORKS, INC.**, 5631 Bickett St., Huntington, Calif.
- **MORSE BROS. MACHINERY CO.**, 2900 Brighton Blvd., Denver 1, Colo.
- **ORTNER COMPANY**, 702 Terrace Plaza, Cincinnati, Ohio
- **PRESSED STEEL CAR CO., INC.**, 25 Broad St., New York 4, N. Y.
- **ROGERS IRON WORKS CO.**, Joplin, Mo.
- **STRAUB MFG. CO.**, 507 Chestnut St., Oakland 7, Calif.
- **UNITED IRON WORKS CO.**, 108 N. Locust, Pittsburg, Kans.
- **UNITED STATES STEEL CO.**, Pittsburgh 30, Pa.

CARS, Railroad, Retaining Doors, Strapping

- **SIGNODE STEEL STRAPPING CO.**, 2600 N. Western Ave., Chicago 47, Ill.

CARTRIDGES, Rotary, Kiln, Slag Removal

- **REMINGTON ARMS CO., INC.**, Barnum Ave., Bridgeport 2, Conn.
- **WINCHESTER REPEATING ARMS CO.**, 275 Winchester Ave., New Haven, Conn.

CASTINGS, Repair Parts

1. Bronze
 2. Grey Iron
 3. Heat Resisting Steel
 4. Malleable
 5. Manganese
 6. Special Alloy
 7. Steel
- **ALLOY RODS CO.**, 3105 W. Market St., York, Pa.
 - **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
 - **THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N. Y.
 - **BAER STEEL PRODUCTS, INC.**, P.O. Box 497, Auburn, Wash.
 - **THE BALDWIN LOCOMOTIVE WORKS**, Philadelphia 42, Pa.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.
1-2-3-4-5-6-7
● **THE BONNOT CO.**, 722 Mulberry St., Canton 2, Ohio

● **CALUMET STEEL CASTINGS CORP.**, 1636 Summer St., Hammond, Ind.

● **THE CHASE FOUNDRY & MFG. CO.**, 2300 S. Parsons Ave., Columbus 7, Ohio

● **COAST METALS, INC.**, 1232 Camden Ave., S. W., Canton 6, Ohio

● **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P.O. Box 673, Connelville, Pa.

● **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.

● **DIAMOND IRON WORKS, INC.**, 1728 2nd St., No., Minneapolis 11, Minn.

● **DOBBIE FOUNDRY & MACHINE CO.**, 146-170 Portage Road, Niagara Falls, N. Y.

● **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

● **THE J. B. EHRMAN & SONS MFG. CO.**, Enterprise, Kans.

● **THE EIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah

● **ELECTRIC STEEL FOUNDRY CO.**, 2141 N. W. 25th Ave., Portland 10, Ore.

● **ELECTRO-ALLOYS DIV. AMERICAN BRAKE SHOE CO.**, Taylor St. & Abbey Road, Elyria, Ohio

● **FARRELL-BIRMINGHAM CO., INC.**, Ansonia, Conn.

● **THE FAHRALLOY CO.**, 149th Lomis St., Harvey, Ill.

● **FARRELL-CHEEK STEEL CO.**, Sandusky, Ohio

● **FREDERICH IRON & STEEL CO.**, Frederick, Md.

● **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

● **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.

● **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.

● **HARDING CO., INC.**, 240 Arch St., York, Pa.

● **HARDSOGG PNEUMATIC TOOL CO.**, 225 So. Benton St., Ottumwa, Iowa

● **ROBERT HOLMES & BROS., INC.**, 3519 Junction Ave., Danville, Ill.

● **IOWA MFG. CO.**, 916 16th St., N. E., Cedar Rapids, Iowa

● **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.

● **KENSINGTON STEEL CO.**, 505 Kensington St., Chicago 28, Ill.

● **MADSEN IRON WORKS, INC.**, 5631 Bickett St., Huntington, Calif.

● **THE MEDART CO.**, 100 Potomac St., St. Louis 18, Mo.

● **McLANAHAN AND STONE CORP.**, Hollidaysburg, Pa.

● **McNALLY-PITTSBURGH MFG. CORP.**, Pittsburg, Kans.

● **NATIONAL BEARING DIV., AM. BRAKE SHOE CO.**, 4930 Manchester St., St. Louis 10, Mo.

● **PETTIBONE MULLIKEN CORP.**, 4710 W. Division St., Chicago 51, Ill.

● **PLYTT FOUNDRY & MACHINE CO.**, 328 No. Sangamon St., Chicago 7, Ill.

● **QUINN WIRE & IRON WORKS**, Boone, Iowa

● **RESISTO-LOY CO.**, 127 Baylis St., S.W., Grand Rapids 7, Mich.

● **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.

● **JOSEPH T. RYERSON & SON, INC.**, 2558 W. 16th St., Chicago 80, Ill.

● **F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.

● **SHEPPARD DIESELS**, Philadelphia St., Hanover, Pa.

● **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.

● **SOUTHERN INDUSTRIAL DIECASTING CO.**, 4th Street S.W. (P. O. Box 363), Moultrie, Ga.

● **SPROUT, WALDRON & CO., INC.**, Muncy, Pa.

● **STEDMAN FOUNDRY & MACHINE CO., INC.**, Aurora, Ind.

● **STEARNS - ROGERS MFG. CO.**, 1720 California St., Denver 2, Colo.

● **STODDY COMPANY**, 11929 E. Slouson Ave., Whittier, Calif.

● **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.

● **THUNDER BAY MFG. CO.**, Box 317, Alpena, Mich.

● **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

● **UNITED IRON WORKS CO.**, 108 N. Locust, Pittsburg, Kans.

● **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

● **WALL COLMONOY CORP.**, 19345 John R. St., Detroit 3, Mich.

● **WEBSTER MFG. CO.**, Tiffin 16, Ohio

● **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

● **R. D. WOOD CO.**, 1072 Public Ledger Bldg., Philadelphia 5, Pa.

● **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

CEMENT

● **MEDUSA PORTLAND CEMENT CO.**, 1000 11th Avenue Bldg., Cleveland 15, Ohio

● **TRINITY PORTLAND CEMENT CO.**, 111 West Monroe St., Chicago 3, Ill.

● **UNIVERSAL ATLAS CEMENT CO.**, Chrysler Bldg., 135 E. 42nd St., New York 17, N. Y.

CEMENT COOLERS (see Coolers, Bulk Cement)

● A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

CEMENT DISPERSION AGENTS

AMERICAN FLUESIT CO. INC., 4011 Red Bank Rd., Cincinnati 27, Ohio.
AUTOLENE LUBRICANTS CO. PROTEX DIVN., 1331 W. Evans Ave., Denver 9, Colo.
DEWEY AND ALMY CHEMICAL CO., 62 Whittemore Ave., Cambridge 40, Mass.
A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N. Y.
THE MASTER BUILDERS CO., 7016 Euclid Ave., Cleveland 3, Ohio
MINERAL PIGMENTS CORP., Washington Blvd., Muirkirk, Md.
NOPCO CHEMICAL CO., First and Essex Sts., Harrison, N. J.
REARDON INDUSTRIES INC., 2837 Stanton Ave., Cincinnati 6, Ohio
SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N. J.
L. SONNEBORN SONS, INC., 300 Fourth Ave., New York 10, N. Y.
SPRAY-O-BOND COMPANY, 2225 N. Humboldt Ave., Milwaukee 12, Wis.

CEMENT AND MASONRY COLORS

BLUE RIDGE TALC CO., INC., P.O. Box 7, Henry 6, Va.
COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.
A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N. Y.
LANDERS-SEGAL COLOR CO., 78 Delevan St., Brooklyn 31, N. Y.
THE MASTER BUILDERS CO., 7016 Euclid Ave., Cleveland 3, Ohio
MINERAL PIGMENTS CORP., Washington Blvd., Muirkirk, Md.
MINNESOTA MINING & MFG. CO., 900 Fauquier Ave., St. Paul 5, Minn.
HYDRO-FORGED STONE ASSOCIATES, INC., 420 Bulky Bldg., Cleveland 15, Ohio
REARDON INDUSTRIES INC., 2837 Stanton Ave., Cincinnati 6, Ohio
RICKETSON MINERAL COLOR WORKS, 229 E. Wisconsin Ave., Milwaukee 6, Wis.
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
L. SONNEBORN SONS, INC., 300 Fourth Ave., New York 10, N. Y.
TAMMS INDUSTRIES, INC., 228 No. LaSalle St., Chicago 1, Ill.
C. K. WILLIAMS & CO., 640 N. 13th St., Easton, Pa.

CEMENT PLANTS, Engineers & Contractors

W. R. BENDY CEMENT PLANT ENGINEER, 9403 Riverview Dr., St. Louis 15, Mo.
BLAW-KNOX DIV. OF BLAW-KNOX CO., P.O. Box 1198, Pittsburgh 30, Pa.
E. LEE HEIDENREICH, JR., 67 Second St., Newburgh, N. Y.
THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N. Y.
HYDROZO PRODUCTS, INC., 3230 University Ave., Madison, Wis.
THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.
KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
HERBERT LAUER, CEMENT PLANT ENGINEER, 420 E. Walnut Lane, Philadelphia 44, Pa.

KLIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
MACDONALD ENGINEERING CO., 188 W. Randolph St., Chicago 1, Ill.
NICHOLSON CO., 10 Rockefeller Plaza, New York 20, N. Y.
PETTIBONE MULLIKEN CORP., 4710 Division St., Chicago 51, Ill.
WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.
WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

CEMENT PUMPS, Finished Cement (see Pumps, Cement)

CEMENT TESTING APPARATUS

AMERICAN INSTRUMENT CO., INC., Silver Spring, Md.
AUTOLENE LUBRICANTS CO. PROTEX DIVN., 1331 W. Evans Ave., Denver 9, Colo.
BURRELL CORP., 1942 Fifth Ave., Pittsburgh 19, Pa.
CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.
FISHER SCIENTIFIC CO., 717 Forbes St., Pittsburgh 19, Pa.
HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
SODEMANN HEAT & POWER CO., 2306 Delmar Blvd., St. Louis 3, Mo.

CENTRAL MIXING PLANTS, Concrete

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
BLAW-KNOX DIV. OF BLAW-KNOX CO., P.O. Box 1198, Pittsburgh 30, Pa.
BUTLER BIN CO., Box 407, Waukegan, Wis.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis, Mo.
CONSTRUCTION MACHINERY CO., Glenwood & Vinton Sts., Waterloo, Iowa
THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
DODSON MFG. CO., 1463 Borwick, Wichita 2, Kans.
ERIE STEEL CONST. CO., Giant Road & N. P. R. R., Erie, Pa.
FLEMING MFG. CO., INC., 4985 Fyler Ave., St. Louis 9, Mo.
GREENVILLE MFG. WORKS, Greenville, Ohio
HARDY SCALES CO., 5701 So. Atlantic Blvd., Hayward, Calif.
E. LEE HEIDENREICH, JR., 67 Second St., Newburgh, N. Y.
THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.
MIXERMOBILE MANUFACTURERS, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.
MULTIPLEX MACHINERY CORP., Elmore, Ohio
NOBLE CO., 1860 Seventh St., Oakland 20, Calif.
WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.

WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

CENTRIFUGES, Cement Slurry, Etc.

BIRD MACHINE CO., South Walpole, Mass.
CENTRIFUGE MECHANICAL EQPT. INC., 95 River St., Hoboken, N. J.
MERCO CENTRIFUGAL CO., 1045 Sansone St., San Francisco 11, Calif.
SEPARATION PROCESS CO., Fuller Bldg., Catasauqua, Pa.
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

CHAIN, Dredge and Shovel

AMERICAN CHAIN DIV. AMERICAN CHAIN & CABLE CO., INC., York, Pa.
BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
THE CLEVELAND CHAIN & MFG. CO., 445 Henry St., Cleveland 5, Ohio
DIAMOND CHAIN CO., INC., 402 Kentucky Ave., Indianapolis 7, Ind.
EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
YAUN WELDING & DRAGLINE BUCKETS, INC., P.O. Box 1508, Baton Rouge, La.

CHAIN DRIVES (see Drives)

CHAIN, Elevating and Conveying

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
BEAUMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
THE CLEVELAND CHAIN & MFG. CO., 445 Henry St., Cleveland 5, Ohio
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
DIAMOND CHAIN CO., INC., 402 Kentucky Ave., Indianapolis 7, Ind.
THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
FARRELL-CHEEK STEEL CO., Sandusky, Ohio
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
KLIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
MCCALLY-PITTSBURG MFG. CORP., Pittsburg, Kans.
JOSEPH T. RYERSON & SON, INC., 2558 W. 16th St., Chicago 80, Ill.
SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
SPROUT, WALDRON & CO., INC., Muncy, Pa.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
WEBSTER MFG. INC., Tiffin 16, Ohio

CHAIN, Heat Exchanger

ELECTRO-ALLOYS DIV. AMERICAN BRAKE SHOE CO., Taylor St. & Abbey Road, Elyria, Ohio
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

CHAIN LINKS, Fittings, Hooks, Etc.

AMERICAN CHAIN DIV. AMERICAN CHAIN & CABLE CO., INC., York, Pa.
AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.
THE CLEVELAND CHAIN & MFG. CO., 445 Henry St., Cleveland 5, Ohio
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
THE THOMAS LAUGHLIN CO., 143 Fore St., Portland 6, Me.
MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
JOSEPH T. RYERSON & SON, INC., 2558 West 16th St., Chicago 80, Ill.

CHAINS, Drag

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.
THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
THE CLEVELAND CHAIN & MFG. CO., 445 Henry St., Cleveland 5, Ohio
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
FARRELL-CHEEK STEEL CO., Sandusky, Ohio
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

- THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
SPROUT, WALDRON & CO., INC., Muncy, Pa.
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

CHUTE LININGS, Rubber

- CARLYLE RUBBER CO., INC.**, 62-66 Park Pl., New York 7, N. Y.
THE CINCINNATI RUBBER MFG. CO., Franklin Ave., Cincinnati 12, Ohio
THE GALIGHER COMPANY, 545 W. 8th South, Salt Lake City, Utah
THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
GOODALL RUBBER CO., Whitehead Road, Trenton 4, N. J.
B. F. GOODRICH CO., Akron 11, Ohio
THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio
HAMILTON RUBBER MFG. CORP., Mead St., Trenton 3, N. J.
HEWITT RUBBER DIV., HEWITT-ROBINS INC., 240 Kensington Ave., Buffalo 5, N. Y.
QUAKER PACIFIC RUBBER CO., 298 Potrero Ave., San Francisco 10, Calif.
QUAKER RUBBER CORP., Tacony & Comly Sts., Philadelphia 24, Pa.
RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.
REPUBLIC RUBBER DIV., LEE RUBBER & TIRE CORP., Albert St., Youngstown 1, Ohio
SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
THERMOID COMPANY, Trenton, N. J.
UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

CHUTE LININGS, Other

- ALLIED STEEL PRODUCTS, INC.**, 7835 Broadway, Cleveland 5, Ohio
AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
THE CARBORUNDUM CO., REFRACTORY DIV., Perth Amboy, N. J.
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
THE FROG, SWITCH & MFG. CO., Carlisle, Pa.
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa
KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.
LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.
MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
MCLANAHAN AND STONE CORP., Hollidaysburg, Pa.

- SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.
STULZ-SICKLES CO., 134 Lafayette St., Newark 5, N. J.
TAYLOR - WHARTON IRON & STEEL CO., High Bridge, N. J.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
VULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.

CHUTES

- AMERICAN VENTILATING HOSE CO.**, 15 Park Row, New York 7, N.Y.
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
L. BURMEISTER CO., 4535 W. Mitchell St., Milwaukee 14, Wis.
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
CONNELLSVILLE MFG. & MINE SUPPLY CO., P. O. Box 673, Connellsville, Pa.
THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
THE FROG, SWITCH & MFG. CO., Carlisle, Pa.
GAR-BRO MFG. CO., 2416 E. 16th St., Los Angeles 21, Calif.
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
GREENVILLE MFG. WORKS, Greenville, Ohio
THE HEILTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.
THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
LIPPMAN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.
MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.
MIXERMOBILE MANUFACTURERS, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.
MCCALLY-PITTSBURG MFG. CORP., Pittsburg, Kans.
PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.
WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.
SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.
TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N.J.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
WEBSTER MFG. INC., Tiffin 16, Ohio

CIRCUIT BREAKERS, Electric

- ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

- GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

CIRCUIT TESTERS, Electric

- E. I. DU PONT DE NEMOURS & CO., INC., EXPLOSIVES DEPT.**, Wilmington 98, Del.
GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

CLARIFIERS, AIR (see Air Filters)

CLARIFIERS, Oil (see Air Filters)

CLASSIFIERS

1. Air
 2. Electrostatic
 3. Hydraulic
- ALLEN CONE & MACHINERY CORP.**, 120 Broadway, New York 5, N. Y.
AMERICAN CYANAMID CO., 30 Rockefeller Plaza, New York 20, N. Y.
BIRD MACHINE CO., South Walpole, Mass.
COLORADO IRON WORKS CO., 1624 17th St., Denver 2, Colo.
THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
THE DEISTER CONCENTRATOR CO., P. O. Box 1, Fort Wayne 1, Ind.
DEISTER MACHINE CO., 1933 East Wayne St., Fort Wayne 4, Ind.
THE DORR CO., INC., Barry Place, Stamford, Conn.
HARDINGE CO., INC., 240 Arch St., York, Pa.
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.
RAYMOND PULVERIZER DIV., COMBUSTION CORP., 1315 N. Branch St., Chicago 22, Ill.
SEPARATIONS ENGINEERING CORP., 110 E. 42nd St., New York 17, N. Y.
SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

CLASSIFIERS, SAND (see Sand Recovery Machinery)

CLEANING MACHINES, Bag (see Bag Cleaners)

CLINKER COOLERS

1. Grate
 2. Rotary
- ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

- THE BONNOT CO.**, 722 Mulberry St., Canton 2, Ohio
THE CONVEYOR CO., 320 East Slauson Ave., Los Angeles 11, Calif.

- FULLER COMPANY**, Fuller Bldg., Catonsville, Pa.

- HARDINGE CO., INC.**, 240 Arch St., York, Pa.

- KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.

- MANITOWOC ENGINEERING WORKS**, Manitowoc, Wis.

- MCDERMOTT BROS. CO.**, Ft. of Washington St., Allentown, Pa.

- NICHOLS ENGINEERING & RESEARCH CORP.**, 70 Pine St., New York 5, N. Y.

- NORDBERG MFG. CO.**, 3073 So. Chase Ave., Milwaukee 7, Wis.

- F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.

- TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

- UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.

- VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

CLIPS, WIRE ROPE (see Wire Rope Fittings)

CLOTH, WIRE (see Wire Cloth)

CLUTCH FACINGS (see Brake Linings)

CLUTCHES

- AMERICAN FLEXIBLE COUPLING CO.**, 1801 Pittsburgh Ave., Erie 1, Pa.
THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.
DODGE MANUFACTURING CORP., Mishawaka, Ind.
THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
HARDINGE CO., INC., 240 Arch St., York, Pa.
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.
THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.
MORSE CHAIN CO., 7601 Central Ave., Detroit 8, Mich.
STEARNS MAGNETIC MFG. CO., 675 S. 28th St., Milwaukee 46, Wis.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

WEBSTER MFG. INC., Tiffin 16, Ohio
 YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

COAL PULVERIZING EQUIPMENT

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
 THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.
 THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
 BLAW-KNOX DIV. OF BLAW-KNOX CO., P.O. Box 1198, Pittsburgh 30, Pa.
 THE BONHOFF CO., 722 Mulberry St., Canton 2, Ohio
 GRUNDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.
 HARDINGE CO., INC., 240 Arch St., York, Pa.
 ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
 IOWA MFG. CO., 916 16th St. N. E., Cedar Rapids, Iowa
 THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
 KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
 LINK BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
 LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
 McNALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.
 THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
 PETTIBONE MULLIKEN CORP., 4110 Division St., Chicago 51, Ill.
 RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO., INC., 1315 N. Branch St., Chicago 22, Ill.
 ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.
 STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.
 F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 WHITING CORP., 15693 Lathrop Ave., Harvey, Ill.
 WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.

COAL PULVERIZING EQUIPMENT, Direct-Firing Unit Mills

THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.
 HARDINGE CO., INC., 240 Arch St., York, Pa.
 KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
 RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO., INC., 1315 N. Branch St., Chicago 22, Ill.
 F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 THE STRONG-SCOTT MFG. CO., Northwestern Terminal, Minneapolis 13, Minn.
 WHITING CORP., 15693 Lathrop Ave., Harvey, Ill.

COLORS, Cement (see Cement and Masonry Colors)

CONCENTRATING TABLES

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
 THE DEISTER CONCENTRATOR CO., P. O. Box 1, Fort Wayne 1, Ind.
 DEISTER MACHINE CO., 1933 East Wayne St., Fort Wayne 4, Ind.
 DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
 GENERAL ENGINES CO., INC., 307 Hunter St., Gloucester, N. J.
 THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
 OVERSTROM & SONS, 2213 W. Mission Road, Alhambra, Calif.
 SEPARATIONS ENGINEERING CORP., 110 E. 42nd St., New York 17, N. Y.
 THE SINK AND FLOAT CORP., Empire State Bldg., New York 1, N. Y.
 STEARNS-ROGERS MFG. CO., 1720 California St., Denver 2, Colo.
 STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
 YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

CONCRETE BLOCK MACHINES (See Block Machines)

CONCRETE CONTROL Systems, Quality

AUTOMATIC LIQUID METER CO., 1372-1378 E. 15th St., Los Angeles 21, Calif.
 CARLYLE RUBBER CO., 64 Park Place, New York 7, N. Y.
 THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.
 M. & J. ENGINEERING CORP., 3928 Millersville Rd., Indianapolis 5, Ind.
 OSWALT ENGINEERING SERVICE CORP., 1335 Circle Ave., Forest Park, Ill.
 SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N. J.

CONCRETE MASONRY REINFORCING

THE CARTER-WATERS CORP., 2440 Pennway, Kansas City 8, Mo.
 HYDRO-FORGED STONE ASSOCIATES, INC., 470 Bulkley Bldg., Cleveland 15, Ohio
 TRUSCON STEEL CO., Albert St., Youngstown 1, Ohio

CONCRETE MIXERS

1. Block Plant
 2. Continuous
 3. Job. Portable
 ALLIED WELDING & MFG. CO., INC., 49 Loma Doane Blvd., Orlando, Fla.
 ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
 BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.
 BESSER MFG. CO., Alpena, Mich.
 CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.

CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.

1
 GEO. C. CHRISTOPHER & SON IRON WORKS CO., 1220 Blaine Wichita 1, Kans.

1-2-3
 COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.

1
 COLUMBIA MACHINE WORKS, 107 S. Grand Ave., Vancouver, Wash.

1
 CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis Mo.

1
 CONSTRUCTION MACHINERY CORP., Glenwood & Vinton Sts., Waterloo, Iowa

1-2-3
 ROY DARDEN INDUSTRIES, INC., P. O. Box 95, North Side Branch, Atlanta 3, Ga.

3
 DES PLAINES CONCRETE PROD. MACHINERY, 930 North Ave. Des Plaines, Ill.

1
 THE DODSON MFG. CO., 1463 Barwise Ave., Wichita 2, Kans.

3
 W. E. DUNN MFG. CO., 550 W. 23rd St., Holland, Mich.

3
 FLEMING MFG. CO., 4985 Fyler Ave., St. Louis, Mo.

1
 GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J.

1-3
 F. C. GEORGE MACHINERY CO., INC., 100 S. Westmoreland Dr., Orlando, Fla.

1-3
 GILSON BROTHERS CO., Fredonia, Wis.

1
 HYDRO-FORGED STONE ASSOCIATES, INC., 470 Bulkley Bldg., Cleveland 15, Ohio

1
 JACKSON & CHURCH CO., 321 N. Hamilton Ave., Saginaw Mich.

1
 THE JAEGER MACHINE CO., 359 W. Spring St., Columbus 16, Ohio

3
 THE KENT MACHINE CO., 193 Thomas St., Cuyahoga Falls, O.

1-3-3
 THE KNICKERBOCKER CO., 603 Liberty St., Jackson, Mich.

3
 KOEHRING CO., 3076 W. Concordia Ave., Milwaukee 16, Wis.

1-2-3
 KWIK-MIX COMPANY, 235 W. Grand Ave., Port Washington Wis.

3
 LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.

1
 THE MILES MFG. CO., P. O. Box 65, Jackson, Mich.

1
 LESLIE C. MILLER SUPPLY INC., P. O. Box 7, Bedford, Ohio

1
 MISHCO CORP., 615 SW 2nd Ave., Miami, Fla.

1-3
 MORTARLESS TILE MACH. CO., INC., 2623 Riverside Dr., Los Angeles 39, Calif.

3
 MULTIPLEX MACHINERY CORP., Elmore, Ohio

1-2-3
 THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

1-2
 PRASCHAK MACHINE CO., Marshfield, Wis.

1
 THE Y. L. SMITH CO., 2835 N. 32nd St., Milwaukee 45, Wis.

SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.

1-2
 STANDARD SAND & MACHINE CO., 549 W. Washington Blvd., Chicago 6, Ill.

1
 STEARNS MFG. CO., INC., 600 E. Beecher St., Adrian, Mich.

1-3
 SUPERIOR - LIDGERWOOD - MUNDY CORP., 7 Day St., New York 7, N. Y.

1-2
 UNIVERSAL CONCRETE MCHY. CO., INC., 297 S. High St., Columbus 15, Ohio

1-2
 UNIVERSAL TAMPERS INC., 1530 N. Adams St., Peoria 3, Ill.

1
 VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.

1
 WILLARD CONCRETE MACHINERY CO., LTD., 2906 Imperial Highway, Lynwood, Calif.

1
 WITTEMANN MACHINERY CO., Paynters Rd., Farmingdale, N. J.

1
 C. M. WOOTEN CO., 2721 N. Central Ave., Knoxville 17, Tenn.

1
 WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

1-2-3
 THE YODER CO., 5552 Walworth Ave., Cleveland, Ohio

CONCRETE MIXERS, Truck (see Bodies, Ready Mixed Concrete)

CONCRETE MIXING PLANTS (see Central Mixing Plants)

CONCRETE PAINTS AND COATINGS

AMERICAN FLUORET CO., INC., 4011 Red Bank Rd., Cincinnati 27, Ohio
 BLUE RIDGE TALC CO., INC., P.O. Box 7, Henry 6, Va.
 THE CARTER-WATERS CORP., 2440 Pennway, Kansas City 8, Mo.
 COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.
 W. E. DUNN MFG. CO., 550 W. 23rd St., Holland, Mich.
 A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N. Y.

1
 HYDRO-FORGED STONE ASSOCIATES, INC., 470 Bulkley Bldg., Cleveland 15, Ohio

1
 HYDROZO PRODUCTS, INC., 2330 University Ave., Madison, Wis.

1
 KAY-TITE CO., 10 White St., West Orange, N. J.

1
 KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

1
 THE MASTER BUILDERS CO., 7016 Euclid Ave., Cleveland 3, Ohio

1
 REARDON INDUSTRIES INC., 2837 Stanton Ave., Cincinnati 6, Ohio

1
 SIKKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N. J.
 L. SONNEBORN SONS, INC., 300 Fourth Ave., New York 10, N. Y.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

SPRAY-O-BOND COMPANY. 2225 N. Humboldt Ave., Milwaukee 12, Wis.

TAMMS INDUSTRIES, INC. 228 No. LaSalle St., Chicago 1, Ill.

TRUSCON LABORATORIES. Caniff & G. T. R. R., Detroit 12, Mich.

CONCRETE PREMIX PLANTS, Dry

• **BUTLER BIN CO.**, Box 407, Waukesha, Wis.

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

• **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

CONCRETE PRODUCTS CURING EQUIPMENT (see Kilns, Concrete Curing)

CONCRETE PRODUCTS HANDLING EQUIPMENT

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

• **BESSER MFG. CO.**, 205 47th St., Alpena, Mich.

• **CARPENTER MFG. CO.**, R. F. D. No. 1, Box 470, Richmond 23, Va.

CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

CONSTRUCTION PRODUCTS CORP., 410 San Fernando Road, Los Angeles 31, Calif.

GENERAL ENGINES CO., INC., 307 Hunter St., Gloucester, N. J.

• **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis, Mo.

GAR-BRO MFG. CO., 2416 E. 16th St., Los Angeles 21, Calif.

GENERAL CONVEYOR & MFG. CO., 3501 Salena St., St. Louis 18, Mo.

ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.

JACKSON & CHURCH CO., 321 N. Hamilton St., Saginaw, Mich.

• **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

LEWIS-SHEPARD PRODUCTS INC., 205 Walnut St., Watertown 72, Mass.

LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.

• **MULTIPLEX MACHINERY CORP.**, Elmore, Ohio

THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

THE PRIME-MOVER CO., Muscatine, Iowa

SCHONROCK EQUIPMENT MFG. CO., P.O. Box 1543, San Angelo, Texas

• **UNIT CRANE & SHOVEL CORP.**, 6411 W. Burnham St., Milwaukee 14, Wis.

WILLARD CONCRETE MACHINERY CO., LTD., 2906 Imperial Highway, Lynwood, Calif.

• **WITTMANN MACHINERY CO.**, Paynters Rd., Farmingdale, N. J.

CONCRETE SPECIALTY FORMS:

- A. Bins, Tanks, Silos
1. Burial Vault
2. Cribbing
3. Curb & Cutoff
4. Fence Posts & Poles
5. Floor System
6. Floor & Roof Slab
7. Garbage Disposal Unit
8. Garden & Ornamental Furniture
9. Joist
10. Laundry Tray
11. Manhole, Curb & Blocks
12. Partition
13. Pipe, Culvert & Sewer
14. Septic Tank
15. Sill & Lintel
16. Step, Precast
17. Tile & Conduit
18. Walls, Foundation

AMERICAN VAULT CO., 579 Kenilworth, Detroit 2, Mich.

ASHLAND VAULT INC., 500-518 Virginia Ave., Ashland 4, Ohio

AUTOLINE LUBRICANTS CO., PROTECT DIV., 1331 W. Evans Ave., Denver 9, Colo.

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

BASALT ROCK CO., INC., 8th & River Sts., Napa, Calif.

• **BERG VAULT CO.**, 1620 Lucas Hunt Rd., St. Louis 20, Mo.

BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.

• **BESSER MFG. CO.**, Alpena, Mich.

• **CARPENTER MFG. CO.**, R. F. D. No. 1, Box 470, Richmond 23, Va.

CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.

COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich

CONCRETE FORMS CORP., 20 Vesey St., New York 7, N. Y.

CONCRETE INDUSTRIES, INC., 15025 Oxnard St., Van Nuys, Calif.

• **CONCRETE MACHINERY CO.**, P.O. Box 2748, Hickory 7, N. C.

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

CURRIER'S ENTERPRISES., 4301 San Fernando Road, Glendale 4, Calif.

• **DES PLAINES CONCRETE PROD. MACHINERY.**, 930 North Ave., Des Plaines, Ill.

• **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

THE FLEXICORE CO., INC., 1932 E. Monument Ave., Dayton 1, Ohio

GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J.

THE HETZEL STEEL FORM AND CO., 1750 Thomas Road, Warren, Ohio

HYDRO-FORGED STONE ASSOCIATES, INC., 420 Bulkley Bldg., Cleveland 15, Ohio

IRVINGTON FORM & TANK CORP., 20 Vesey St., New York 7, N. Y.

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

LIFETIME BUILDING SPECIALTIES, INC., 519 Brook Haven Dr., Orlando, Fla.

MULTIPLEX MACHINERY CORP., Elmore, Ohio

QUINN WIRE & IRON WORKS., Boone, Iowa

• **STEARN'S MFG. CO., INC.**, 600 E. Beecher St., Adrian, Mich.

UNIVERSAL CONCRETE MCHY. CO., INC., 297 S. High St., Columbus 15, Ohio

WITTMANN MACHINERY CO., Paynters Rd., Farmingdale, N. J.

IRVINGTON FORM & TANK CORP., 20 Vesey St., New York 7, N. Y.

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

METAL FORMS CORP., 3334 N. Booth St., Milwaukee 12, Wis.

• **MISHCO CORP.**, 615 SW 2nd Ave., Miami, Fla.

• **MULTIPLEX MACHINERY CORP.**, Elmore, Ohio

PRE-CAST STEP FORM CO., 1305 Selby Ave., St. Paul 4, Minn.

• **QUINN WIRE & IRON WORKS.**, Boone, Iowa

SAN-BIN CORP. OF BUFFALO., 338 Scajaquada St., Buffalo 11, N. Y.

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

SYMONS CLAMP & MFG. CO., 4269 Diversey Ave., Chicago 39, Ill.

UNIVERSAL CONCRETE MCHY. CO., INC., 297 S. High St., Columbus 15, Ohio

• **WITTMANN MACHINERY CO.**, Paynters Rd., Farmingdale, N. J.

CONCRETE SPECIALTY MACHINES

1. Chimney & Flue Block
2. Fence Post
3. Joist & Slab
4. Pipe, Culvert & Sewer
5. Roof Tile
6. Sill & Lintel
7. Silo Stave
8. Tile & Conduit

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

E. P. BARBER CO., 560 W. Valley Blvd., Bloomington, Calif.

• **BESSER MFG. CO.**, Alpena, Mich.

CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.

• **COLUMBIA MACHINE WORKS.**, 107 S. Grand Ave., Vancouver, Wash.

CONCRETE INDUSTRIES, INC., 15025 Oxnard St., Van Nuys, Calif.

• **CONCRETE MACHINERY CO.**, P.O. Box 2248, Hickory 7, N. C.

CONCRETE PIPE MACHINERY CO., East Ninth & Division Sts., Sioux City 19, Iowa

• **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis, Mo.

GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J.

HOUSTON CONCRETE MACHINERY., 6600 Washington Ave., Houston 7, Texas

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

LIFETIME BUILDING SPECIALTIES, INC., 519 Brook Haven Dr., Orlando, Fla.

MULTIPLEX MACHINERY CORP., Elmore, Ohio

QUINN WIRE & IRON WORKS., Boone, Iowa

• **STEARN'S MFG. CO., INC.**, 600 E. Beecher St., Adrian, Mich.

UNIVERSAL CONCRETE MCHY. CO., INC., 297 S. High St., Columbus 15, Ohio

WITTMANN MACHINERY CO., Paynters Rd., Farmingdale, N. J.

CONCRETE WATER-PROOFING AND DAMP-PROOFING

• **THE BARRETT DIV., ALLIED CHEMICAL & DYE CORP.**, 40 Rector St., New York 6, N. Y.

THE CARTER-WATERS CORP., 2440 Pennway, Kansas City 8, Mo.

BLUE RIDGE TALC CO., INC., P.O. Box 7, Henry 6, Va.

COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.

• **LITH-I-BAR CO.**, Holland, Mich.

MARTIN IRON WORKS., 1222 E. 28th St., Los Angeles, Calif.

THE MILES MFG. CO., P. O. Box 65, Jackson, Mich.

LESLIE C. MILLER SUPPLY INC., P. O. Box 7, Bedford, Ohio

• **MISHCO CORP.**, 615 SW 2nd Ave., Miami, Fla.

• **MULTIPLEX MACHINERY CORP.**, Elmore, Ohio

• **PRASCHAK MACHINE CO.**, Marshfield, Wis.

• **QUINN WIRE & IRON WORKS.**, Boone, Iowa

• **STEARN'S MFG. CO., INC.**, 600 E. Beecher St., Adrian, Mich.

UNIVERSAL CONCRETE MCHY. CO., INC., 297 S. High St., Columbus 15, Ohio

VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.

• **WITTMANN MACHINERY CO.**, Paynters Rd., Farmingdale, N. J.

C. M. WOOTEN CO., 2721 N. Central Ave., Knoxville 17, Tenn.

CONCRETE WATER-PROOFING AND DAMP-PROOFING

• **THE BARRETT DIV., ALLIED CHEMICAL & DYE CORP.**, 40 Rector St., New York 6, N. Y.

THE CARTER-WATERS CORP., 2440 Pennway, Kansas City 8, Mo.

BLUE RIDGE TALC CO., INC., P.O. Box 7, Henry 6, Va.

COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.

• **DEWEY AND ALMY CHEMICAL CO.**, 62 Whittemore Ave., Cambridge 40, Mass.

HOPPER PRODUCTS, INC., 12 E. 41st St., New York 17, N. Y.

A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N. Y.

HYDRO-FORGED STONE ASSOCIATES, INC., 420 Bulkley Bldg., Cleveland 15, Ohio

HYDROZO PRODUCTS, INC., 3230 University Ave., Madison, Wis.

KAY-TITE CO., 10 White St., West Orange, N. J.

JOHNS-MANVILLE., 22 E. 40th St., New York 16, N. Y.

KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

• **THE MASTER BUILDERS CO.**, 7016 Euclid Ave., Cleveland 3, Ohio

E. L. MOORE CO., 1931 Oakwood St., Pasadena 7, Calif.

NOPCO CHEMICAL CO., First and Essex Sts., Harrison, N. J.

THE REARDON CO., 2208 N. Second St., St. Louis 6, Mo.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N. J.

L. SONNEBORN SONS, INC., 300 Fourth Ave., New York 10, N. Y.

SPRAY-O-BOND COMPANY., 2225 N. Humboldt Ave., Milwaukee 12, Wis.

TAMMS INDUSTRIES, INC., 228 No. LaSalle St., Chicago 1, Ill.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

CONDUIT, Electrical

- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
- JOHN-MANVILLE, 22 E. 40th St., New York 16, N. Y.
- REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio

CONTROL SYSTEMS

1. Draft
 2. Pressure
 3. Temperature
- BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio
 - 1-2-3
 - THE BRISTOL CO., Waterbury 20, Conn.
 - 1-2-3
 - THE HAYS CORP., East 8th St., Michigan City, Ind.
 - 1
 - LEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.
 - 1-2-3
 - MANNING, MAXWELL & MOORE, INC., 11 Elias St., Bridgeport 2, Conn.
 - 2-3
 - MINNEAPOLIS - HONEYWELL REGULATOR CO. BROWN INSTRUMENTS DIV., Wayne & Winderm Ave., Philadelphia 44, Pa.
 - 1-2-3
 - PYROMETER INSTRUMENT CO., INC., 92 Portland Ave., Bergenfield, N. J.
 - 3
 - F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 - 1-2-3
 - STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.
 - 2
 - WHEELCO INSTRUMENTS CO., 847 W. Harrison St., Chicago 7, Ill.
 - 3

CONTROLS, Bin and Tank Level

- BLAW-KNOX DIV. OF BLAW-KNOX CO., P.O. Box 1198, Pittsburgh 30, Pa.
- FULLER COMPANY, Fuller Bldg., Catasqua, Pa.
- THE HAYS CORP., East 8th St., Michigan City, Ind.
- MINNEAPOLIS - HONEYWELL REGULATOR CO. BROWN INSTRUMENTS DIV., Wayne & Roberts Aves., Philadelphia 44, Pa.
- MOSHER ELECTRONIC CONTROLS, 25 Boston Post Rd., Larchmont, N. Y.
- F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
- STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

CONVERTERS, Electric

- ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
- B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
- THE BIN-DICATOR CO., 13946 Kercheval Ave., Detroit 15, Mich.
- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
- I-T-E CIRCUIT BREAKER CO., 19th and Hamilton St., Philadelphia 30, Pa.
- KATO ENGINEERING CO., 108 Maxwell St., Mankato, Minn.
- MINNEAPOLIS - HONEYWELL REGULATOR CO. BROWN INSTRUMENTS DIV., Wayne & Roberts Aves., Philadelphia 44, Pa.
- TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

CONVEYOR BELT TRIP-PERS

- THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
- BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
- CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
- CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
- THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.
- CONVEYOR ENGINEERING & SUPPLIES CORP., Hobart Pl. D.L.W.R.R., Clifton, N. J.
- THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
- A. B. FARQUHAR CO., 142 N. Duke St., York, Pa.
- GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
- GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.
- WEBSTER MFG. INC., Tiffin 16, Ohio
- THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio
- GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.
- ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
- IOWA MFG. CO., 916 16th St. N. E., Cedar Rapids, Iowa
- THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
- LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
- LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
- E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
- W. A. RIDDELL CORP., Bucyrus, Ohio
- STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
- TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.
- UNIVERSAL ENGINEERING CORP., 625 C Ave. N. W., Cedar Rapids, Iowa
- WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

CONVEYOR IDLERS, Belt

- AUSTIN-WESTERN CO., Aurora, Ill.
- BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.
- THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
- BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
- BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio
- CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
- CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
- THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.
- CONVEYOR ENGINEERING & SUPPLIES CORP., Hobart Pl. D.L.W.R.R., Clifton, N. J.
- COYLE & ROTH, 3024 4th St. S. E., Minneapolis 14, Minn.
- DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.

- THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
- GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
- GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.
- GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.
- ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
- ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
- IOWA MFG. CO., 916 16th St. N. E., Cedar Rapids, Iowa
- THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
- JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
- KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
- FRANK A. KREMER & SONS, INC., 3435-45 N. 5th St., Philadelphia 40, Pa.
- LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
- LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
- E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
- McNALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.
- NORTHERN CONVEYOR CO., 327 W. State St., Jonesville, Wis.
- PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.
- PYOTT FOUNDRY & MACHINE CO., 328 No. Sangamon St., Chicago 7, Ill.
- SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
- SPROUT, WALDRON & CO., INC., Muncy, Pa.
- STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
- TRIANGLE ENGINEERING CO., 2848 W. 25th St., Chicago 23, Ill.
- TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.
- UNITED IRON WORKS CO., 108 N. Locust, Pittsburgh, Kans.
- UNIVERSAL ENGINEERING CORP., 625 C Ave. N. W., Cedar Rapids, Iowa
- WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
- WEBSTER MFG. INC., Tiffin 16, Ohio

CONVEYORS, Materials Handling

1. Aeration
 2. Air
 3. Apron
 4. Belt
 5. Belt, Portable
 6. Drag
 7. Overhead Bridge
 8. Pan
 9. Screw
 10. Vibrating
 11. Weight Recording
- ALLIED WELDING & MFG. CO., INC., 49 Lorna Doone Blvd., Orlando, Fla.
 - AJAX FLEXIBLE COUPLING CO., INC., Westfield, N. Y.
 - ALLEN - SHERMAN - HOFF CO., Lewis Tower Bldg., Philadelphia 2, Pa.

- ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
- ANDERSON ENGINEERING CO., 237 Bent St., Cambridge 41, Mass.
- AUSTIN-WESTERN CO., Aurora, Ill.
- 3-4-5-10
- BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.
- 3-4-5-6
- THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
- 3-4-5-6-8-9
- BAUGHMAN MFG. CO., INC., Jerseyville, Ill.
- 4-5-9
- BEAUMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.
- 2-6-7
- BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.
- 3
- BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
- 3-4-5-6
- BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio
- 1-4-5
- BOSTON WOVEN ROSE & RUBBER CO., P. O. Box 1071, Boston 3, Mass.
- 3
- THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 40, Ill.
- 2-3-4-5-6-7-8-9
- BROOKS EQUIPMENT & MFG. CO., 408-10 Davenport Road, Knoxville 3, Tenn.
- 3
- L. BURMEISTER CO., 4535 W. Mitchell St., Milwaukee 14, Wis.
- 4-6-9
- BUTLER BIN CO., Box 407, Waukesha, Wis.
- 4-9
- CARLEY RUBBER CO., INC., 62-66 Park Pl., New York 7, N. Y.
- 4-5
- CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
- 7
- CHICAGO STEEL FOUNDRY CO., 3720 So. Kedzie Ave., Chicago 32, Ill.
- 7
- THE CLEVELAND CRANE & ENGINEERING CO., 5866 E. 289th St., Wickliffe, Ohio
- 7
- CLYDE IRON WORKS, INC., P.O. Box 370, Duluth 1, Minn.
- 7
- COLLINS EQUIPMENT & SUPPLY CO., 19 E. Jefferson St., Joliet, Ill.
- 4
- CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
- 4
- CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connellsville, Pa.
- 3-4-6-8
- CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
- 3-4-5-9
- THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.
- 3-4-5-6-9
- CONVEYOR ENGINEERING & SUPPLIES CORP., Hobart Pl. D.L.W.R.R., Clifton, N. J.
- 1-4-5-6
- 7-8-9-10
- COYLE & ROTH, 3024 4th St. S. E., Minneapolis 14, Minn.
- 7
- C. R. DANIELS, INC., 4900 Wetheredville Rd., Baltimore 16, Md.
- 7
- ROY DARDEN INDUSTRIES, INC., P. O. Box 95, North Side Branch, Atlanta 3, Ga.
- 3-4
- DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
- 3-4
- DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.
- 4-5

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DIRECTORY

DOWNES CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.

EAGLE CRUSHER CO., INC., 900 Harding Way E., Galion, Ohio 4

THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans. 4-9

THE FAHNR BEARING CO., 37 Booth St., New Britain, Conn. 4

A. B. FARQUHAR CO., 142 N. Duke St., York, Pa. 4-5-6

FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo. 9

FULLER COMPANY, Fuller Bldg., Catsasqua, Pa. 2

GAR-BRO MFG. CO., 2416 E. 16th St., Los Angeles 21, Calif. 4

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo. 3-4-5-6-8-9-10

GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J. 4

F. C. GEORGE MACHINE CO., INC., 100 S. Westmoreland Dr., Orlando, Fla. 4

GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y. 3-4-5-6-8-9-10

GOODALL RUBBER CO., Whitehead Road, Trenton 4, N. J. 4

GREENVILLE MFG. WORKS, Greenville, Ohio 4

THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio 4-5

GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo. 3-4-5-6

GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y. 1-2-3-4-5-6-7-8-9-10

HARDING CO., INC., 240 Arch St., York, Pa. 2-9

THE HETZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio 2-4-9-10

HERCULES STEEL PRODUCTS CORP., Sherman St., Galion, Ohio 5

ROBINS CONVEYORS DIV., HE-WITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J. 3-4-5-6-7-8-9-10

ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill. 3-4-5-6-7-9

THE C. S. JOHNSON CO., P.O., Box 71, Champaign, Ill. 1-4-9-11

IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa 4-5-9

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio 3-4-5-6-8-9-10-11

JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa. 4-5

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y. 2-3-4-5-6-8-9

KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill. 3-4-5

THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio 4

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio 2

KORB-PETTIT WIRE FABRICS & IRON WORKS, INC., 1505-15 N. Mascher St., Philadelphia 22, Pa. 3-4

FRANK A. KREMSEY & SONS, INC., 3435-45 N. 5th St., Philadelphia 40, Pa. 4-6

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill. 1-3-4-6-7-8-9-10

LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis. 3-4-5-9-11

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa. 3-6-9

E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo. 3-4-5-6-8

MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill. 4-6

MERRICK SCALE MFG. CO., 180 Autumn St., Passaic, N. J. 11

LESLIE C. MILLER SUPPLY INC., P. O. Box 7, Bedford, Ohio 4

THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo. 4

MULTIPLEX MACHINERY CORP., Elmore, Ohio 4

MCLANAHAN AND STONE CORP., Hollidaysburg, Pa. 3

MCCALL-PITTSBURG MFG. CORP., Pittsburg, Kans. 1-4-6-7-8-9-10

NOBLE CO., 1860 Seventh St., Oakland 20, Calif. 4

NORTHERN CONVEYOR CO., 327 W. State St., Jamestown, Wis. 4-5-6-8

PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill. 4-5-6

PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn. 4-5

POSEY IRON WORKS, INC., INDUSTRIAL HEATING DIVN., 560 S. Prince St., Lancaster, Pa. 2-9

PRASCHAK MACHINE CO., Marshfield, Wis. 4

PRODUCTIVE EQUIPMENT CORP., 2926 W. Lake St., Chicago 12, Ill. 10

RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J. 4

W. A. RIDDELL CORP., Bucyrus, Ohio 4

ROBINSON AIR-ACTIVATED CONVEYOR SYSTEMS, 205 E. 42nd St., New York 17, N. Y. 2

ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo. 4-5

SALEM TOOL CO., 700 S. Ellsworth St., Salem, Ohio 9

SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill. 2

SINTERING MACHINERY CORP., Netcong, N. J. 4-11

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y. 10

SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis. 3-4-5

SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla. 4-5-6-8-9-10

THE SPENCER TURBINE CO., 486 New Park Ave., Hartford 6, Conn. 2

SPROUT, WALDRON & CO., INC., Muncy, Pa. 4-9

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill. 3-4-5-6-8-9-10

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass. 4-9

SYNTRON CO., 450 Lexington Ave., Homer City, Pa. 10-11

TAYLOR - WHARTON IRON & STEEL CO., High Bridge, N. Y. 8

TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa. 3-4-5-6

TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill. 3-4-5-6-7-8

TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J. 3-4-5-6-7-8

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans. 1-4-5-6-7-8-9

UNIVERSAL ENGINEERING CORP., 625 C Ave., N. W., Cedar Rapids, Iowa 3-4-5-9

VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J. 4

WEBSTER MFG. INC., Tiffin 16, Ohio 3-4-5-9

THE WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 5, Ohio 7

WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif. 3

WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CO., 500 Fifth Ave., New York 18, N. Y. 4

WILLARD CONCRETE MACHINERY CO., LTD., 2906 Imperial Highway, Lynwood, Calif. 4

WITTEMANN MACHINERY CO., Paynters Road, Farmingdale, N. J. 4-6

COOLERS, Bulk Cement

THE BONNOT CO., 722 Mulberry St., Canton 2, Ohio

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif. 4

FULLER COMPANY, Fuller Bldg., Catsasqua, Pa.

HARDING CO., INC., 240 Arch St., York, Pa.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

COOLERS, Cement Clinker (see Clinker Coolers)

CORRECTING, BASINS, Slurry

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

COUPLINGS, Hose (see Hose Fittings)

COUPLINGS, Pipe

BARCO MFG. CO., 1801 W. Winemac Ave., Chicago 40, Ill.

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

THE FLORI PIPE CO., 601-29 E. Red Bud Ave., St. Louis 15, Mo.

VICTAULIC CO. OF AMERICA, 30 Rockefeller Plaza, New York 20, N. Y.

WALWORTH CO., 60 East 42nd St., New York 17, N. Y.

COUPLINGS, Shaft, Flexible Shaft (see Drives)

CRANE, Boom, Cable Stabilizer

DOBIE FOUNDRY & MACHINE CO., 145-170 Portage Road, Niagara Falls, N. Y.

HARNISCHFEGGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

LINK-BELT SPEEDER CORP., 1201 Sixth St., S.W., Cedar Rapids, Iowa

M. P. McCAFFREY, INC., 2121 East 25th St., Los Angeles 11, Calif.

CRANES, Crawler

1. Diesel
2. Electric
3. Gasoline

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

AUSTIN-WESTERN CO., Aurora, Ill.

BAY CITY SHOVELS, INC., Bay City, Mich.

BUCYRUS-ERIE CO., South Milwaukee, Wis.

THE BYERS MACHINE CO., Lock Box 390, Ravenna, Ohio

ELECTRO LIFT, INC., 30 Church St., New York 7, N. Y.

ELWELL-PARKER ELECTRIC CO., 4205 St. Clair Ave., Cleveland 8, Ohio

THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio

HARNISCHFEGGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

HYSTER CO., 2918 N.E. Clockmas, Portland 8, Ore.

INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.

KEYSTONE DRILLER CO., 8th Ave., Beaver Falls, Pa.

KOEHRING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.

LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP., South Main St., Lima, Ohio

LINK-BELT SPEEDER CORP., 1201 Sixth St. S. W., Cedar Rapids, Iowa

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

MARION POWER SHOVEL CO., 617 W. Center St., Marion, Ohio

MICHIGAN POWER SHOVEL CO., 250 Miller Road, Benton Harbor, Mich.

NORTHWEST ENGINEERING CO., 135 S. LaSalle St., Chicago 3, Ill.

ORTON CRANE & SHOVEL CO., 608 S. Dearborn St., Chicago 5, Ill.

THE OSCOOD CO., Marion, Ohio

SHEPPARD DIESELS, Philadelphia St., Hanover, Pa.

SHEPARD NILES CRANE & HOIST CORP., Schuyler Ave., Montaur Falls, N. Y.

SILENT HOIST & CRANE CO., 841 63rd St., Brooklyn 20, N. Y.

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DIRECTORY

•THE THEW SHOVEL CO., 1000 E. 28th St., Lorain, Ohio
1-2-3

•TRACKSON COMPANY, 3333 S. Chase Ave., Milwaukee 7, Wis.
1

•UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14, Wis.
1-3

•WAYNE CRANE DIV., AMERICAN STEEL DREDGE CO., INC., P. O. Box 570, Fort Wayne 1, Ind.
1-3

•WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
1-3

CRANES, Locomotive

1. Diesel
2. Electric
3. Gasoline
4. Electric Generator

•AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.
1-2-3-4

•BAKER INDUSTRIAL TRUCK DIV., THE BAKER-RAULANG CO., 1250 W. 80th St., Cleveland 2, Ohio
2

•THE BROWNING CRANE & SHOVEL CO., 16226 Waterloo Road, Cleveland 10, Ohio
1-3

•CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.
1-2-3-4

•HYSTER CO., 2902 N. E. Clackamas, Portland 8, Ore.
3

•INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.
1

•KEYSTONE DRILLER CO., 8th Ave., Beaver Falls, Pa.
1-2-3

•KOENRIG CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.
1-2-3

•LINK-BELT SPEDER CORP., 1201 51st St. S.W., Cedar Rapids, Iowa
1-2-3-4

•ORTON CRANE & SHOVEL CO., 608 S. Dearborn St., Chicago 5, Ill.
1-2-3-4-5

•SHEPARD NILES CRANE & HOIST CORP., Schuyler Ave., Montour Falls, N. Y.
2

•SILENT HOIST & CRANE CO., 841 63rd St., Brooklyn 20, N. Y.
3

CRANES, Truck-Mounted

•BAY CITY SHOVELS, INC., Bay City, Mich.
1

•THE BROWNING CRANE & SHOVEL CO., 16226 Waterloo Road, Cleveland 10, Ohio
1-3

•BUZYRUS-ERIE CO., South Milwaukee, Wis.
1

•THE BYERS MACHINE CO., Lock Box 370, Ravenna, Ohio
1

•CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.
1-2-3-4

•DEMPTER BROTHERS, INC., Springdale St., Knoxville 17, Tenn.
1

•CAR WOOD INDUSTRIES, INC., Wayne Div., Wayne, Mich.
1

•THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio
1

•HARNISCHFEGGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.
1

•HYSTER CO., 2902 N. E. Clackamas, Portland 8, Ore.
1

•INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.
1

•KOENRIG CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.
1

•R. G. LOUREAU, INC., 2301 N. Adams St., Peoria, Ill.
1

•LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP., South Main St., Lima, Ohio
1

•LINK-BELT SPEDER CORP., 1201 Sixth St. S. W., Cedar Rapids, Iowa
1

•MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.
1

•MICHIGAN POWER SHOVEL CO., 250 Miller Road, Benton Harbor, Mich.
1

•NORTHWEST ENGINEERING CO., 135 S. LaSalle St., Chicago 3, Ill.
1

•ORTON CRANE & SHOVEL CO., 608 S. Dearborn St., Chicago 5, Ill.
1

•THE OSGOOD CO., Marion, Ohio
1

•"QUICK-WAY" TRUCK SHOVEL CO., 2401 E. 40th Ave., Denver 5, Colo.
1

•SCHIELD BANTAM CO., 216 Park St., Waverly, Iowa
1

•SHEPARD NILES CRANE & HOIST CORP., Schuyler Ave., Montour Falls, N. Y.
1

•SILENT HOIST & CRANE CO., 841 63rd St., Brooklyn 20, N. Y.
1

•THE THEW SHOVEL CO., 1000 E. 28th St., Lorain, Ohio
1

•UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14, Wis.
1

•WAYNE CRANE DIV., AMERICAN STEEL DREDGE CO., INC., P. O. Box 570, Fort Wayne 1, Ind.
1

•WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
1

•DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Road, Niagara Falls, N. Y.
1

•ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
1

•McKIERMAN-TERRY CORP., 505 Manor Ave., Harrison, N. J.
1

•ORTON CRANE & SHOVEL CO., 608 S. Dearborn St., Chicago 5, Ill.
1

•SHEPARD NILES CRANE & HOIST CORP., Schuyler Ave., Montour Falls, N. Y.
1

•THE WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 4, Ohio
1

CRIMPERS, BLASTING CAP (see Blasting Supplies)

CRUSHERS

1. Gyratory
2. Hammer
3. Impact
4. Jaw
5. Laboratory
6. Ring-Roll
7. Roll

•ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.
1-2-3-4-5-6

•ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
1-2-3-4-5-6

•AMERICAN PULVERIZER CO., 1249 Macklind Ave., St. Louis 10, Mo.
1-2-3-4-5-6

•AMERICAN PULVERIZER CO., 1249 Macklind Ave., St. Louis 10, Mo.
1-2-3-4-5-6

•ATHEY PRODUCTS CORP., 5631 W. 65th St., Chicago 38, Ill.
1-2-3

•AUSTIN-WESTERN CO., Aurora, Ill.
1-2-3-4-5-6-7

•BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.
1-2-3-4-5-6-7

•BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.
1-2-3-4

•THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
1-2-3-4-5-6-7

•BIRDSBORO STEEL FOUNDRY & MACHINE CO., Birdsboro, Pa.
1-2-3-4-5-6-7

•BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio
1

•THE BONHOT CO., 722 Mulberry S.E., Canton 2, Ohio
1-2-3-4-5-6-7

•BROOKS EQUIPMENT & MFG. CO., 408-10 Davenport Road, Knoxville 3, Tenn.
1-2-3-4-5-6-7

•CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.
1-2-3-4-5-6-7

•DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
1-2-3-4-5-6-7

•THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.
1-2-3-4-5-6-7

•DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.
1-2-3-4-5-6-7

•EAGLE CRUSHER CO., INC., 900 Harding Way E., Galion, Ohio
1-2-3-4-5-6-7

•EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa
1-2-3-4-5-6-7

•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
1-2-3-4-5-6-7

•ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
1-2-3-4-5-6-7

•FARREL - BIRMINGHAM CO., Ansonia, Conn.
1-2-3-4-5-6-7

•GILSON BROTHERS CO., Fredonia, Wis.
1-2-3-4-5-6-7

•GREENVILLE MFG. WORKS, Greenville, Ohio
1-2-3-4-5-6-7

•GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.
1-2-3-4-5-6-7

•HAMMERMILLS, INC. DIV. OF PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.
1-2-3-4-5-6-7

•ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
1-2-3-4-5-6-7

•ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
1-2-3-4-5-6-7

•IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa
1-2-3-4-5-6-7

•THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
1-2-3-4-5-6-7

•KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
1-2-3-4-5-6-7

•KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.
1-2-3-4-5-6-7

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
1-2-3-4-5-6-7

•LIPPMAN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
1-2-3-4-5-6-7

•THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
1-2-3-4-5-6-7

•MORSE BROS. MACHINERY CO., 2900 Brighton Blvd., Denver 1, Colo.
1-2-3-4-5-6-7

•McLANAHAN AND STONE CORP., Hollidaysburg, Pa.
1-2-3-4-5-6-7

•McNALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.
1-2-3-4-5-6-7

•NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.
1

•PENNSYLVANIA CRUSHER CO., Liberty Trust Bldg., Philadelphia 7, Pa.
1-2-3-4-5-6-7

•PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.
1-2-3-4-5-6-7

•FRASCHER MACHINE CO., Marshfield, Wis.
1-2-3-4-5-6-7

•PULVERIZING MACHINERY CO., Chatham Road, Summit, N. J.
1-2-3-4-5-6-7

•ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.
1-2-3-4-5-6-7

•SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
1-2-3-4-5-6-7

•STEDMAN FOUNDRY & MACHINE CO., INC., Indiana Ave., Aurora, Ill.
1-2-3-4-5-6-7

•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
1-2-3-4-5-6-7

•STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
1-2-3-4-5-6-7

•STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.
1-2-3-4-5-6-7

•SUPERIOR-LIDGERWOOD-MUNDY CORP., 7 Day St., New York 7, N. Y.
1-2-3-4-5-6-7

•TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.
1-2-3-4-5-6-7

•UNITED IRON WORKS CO., 108 No. Lucust, Pittsburgh, Kans.
1-2-3-4-5-6-7

•UNIVERSAL ENGINEERING CORP., 625 C Ave. N. W., Cedar Rapids, Iowa
1-2-3-4-5-6-7

•UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N. Y.
1-2-3-4-5-6-7

•THE WEBB CORP., 402 E. Broadway, Webb City, Mo.
1-2-3-4-5-6-7

•WEBSTER MFG. INC., Tiffin 16, Ohio
1-2-3-4-5-6-7

•WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
1-2-3-4-5-6-7

•WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.
1-2-3-4-5-6-7

CRUSHING AND SCREENING PLANTS, Complete

•ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
1-2-3-4-5-6-7

•ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1-2-3-4-5-6-7

•AUSTIN-WESTERN CO., Aurora, Ill.
1-2-3-4-5-6-7

•THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
1-2-3-4-5-6-7

•BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
1-2-3-4-5-6-7

•CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.
1-2-3-4-5-6-7

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
1-2-3-4-5-6-7

•DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.
1-2-3-4-5-6-7

•THE DORR CO. INC., Barry Pl., Stamford, Conn.
1-2-3-4-5-6-7

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

•FARREL - BIRMINGHAM CO. INC., Ansonia, Conn.
GREENVILLE MFG. WORKS, Greenville, Ohio

•GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.

•HAMMERMILLS, INC., DIV. OF PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.

E. LEE HEIDENREICH, JR., 67 Second St., Newburgh, N. Y.
ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

•IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LIPPMAN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

•MCLANAHAN AND STONE CORP., Hollidaysburg, Pa.

•PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

•W. A. RIDDELL CORP., Bucyrus, Ohio

WM. F. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.

ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

•SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

STEDMAN FOUNDRY & MACHINE CO., INC., Aurora, Ind.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

•TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

•UNIVERSAL ENGINEERING CORP., 625 C Ave. N. W., Cedar Rapids, Iowa

•UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N. Y.

•WILLIAMS PATENT CRUSHER & PULVERIZER CO., INC., 2701 N. Broadway, St. Louis 6, Mo.

CRUSHING AND SCREENING PLANTS, Mobile Mounted

•AUSTIN-WESTERN CO., Aurora, Ill.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.

EAGLE CRUSHER CO., INC., 900 Harding Way E., Gallon, Ohio

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

•GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.

•HAMMERMILLS, INC., DIV. OF PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.

•IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa

•LIPPMAN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

•PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

•SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

•UNIVERSAL ENGINEERING CORP., 625 C Ave. N. W., Cedar Rapids, Iowa

•UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N. Y.

CUPOLAS, Rock Wool (see Rock Wool Cupolas and Equipment)

CURING COMPOUNDS, Concrete

ALUMINUM INDUSTRIES, INC., 2438 Beekman St., Cincinnati 25, Ohio

THE CARTER-WATERS CORP., 2440 Pennway, Kansas City 8, Mo.

•DEWEY AND ALMY CHEMICAL CO., 62 Whittemore Ave., Cambridge 40, Mass.

THE DOW CHEMICAL CO., Midland, Mich.

•E. I. DuPont De Nemours & Co., Nemours Bldg., Wilmington 98, Del.

A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N. Y.

•THE MASTER BUILDERS CO., 7016 Euclid Ave., Cleveland 3, Ohio

PHILADELPHIA QUARTZ CO., Public Ledger Bldg., 6th & Chestnut Sts., Philadelphia 6, Pa.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

L. SONNEBORN SONS, INC., 300 Fourth Ave., New York 10, N. Y.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt Ave., Milwaukee 12, Wis.

CURING ROOM DOORS

UNIVERSAL DOOR CARRIER, INC., 1117 Cornell Ave., Indianapolis 2, Ind.

CURING ROOM HEATERS

•CAMPION FUEL ENG. DIV., P.O. Box 3941P, Detroit 27, Mich.

CUTTER-HEADS, Dredging

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

BIRDSBORO STEEL FOUNDRY & MACHINE CO., Birdsboro, Pa.

•BUCYRUS-ERIE CO., South Milwaukee, Wis.

•EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

ELLCOTT MACHINE CORP., 1611 Bush St., Baltimore 30, Md.

MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.

CUTTERS, Fuse (see Blasting Supplies)

CUTTING WHEELS, Abrasive for Concrete

CHAMPION MANUFACTURING CO., 2028 Washington Ave., St. Louis 3, Mo.

RAYBESTOS-MANHATTAN, INC., 61 Willett St., Passaic, N. J.

STONE MACHINERY CO., INC., 399 Favette St., Manlius, N. Y.

VICTOR ENGINEERING CORP., 27 Moplewood Ave., Philadelphia 44, Pa.

D

DEHYDRATORS (see Slurry Thickeners)

DERRICKS, Barge

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.

INGALLS SHIPBUILDING CORP., P. O. Drawer 2638, Birmingham 2, Ala.

SUPERIOR-LIDGERWOOD-MUNDY CORP., Superior, Wis.

DERRICKS, Stiff-Leg and Guy

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.

DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.

GAR WOOD INDUSTRIES, INC., WAYNE DIV., Wayne, Mich.

•THE HAYWARD CO., 202-204 Fulton St., New York, N. Y.

•MCKIERNAN-TERRY CORP., 505 Manor Ave., Harrison, N. J.

SUPERIOR-LIDGERWOOD-MUNDY CORP., Superior, Wis.

DETONATORS (see Blasting Supplies)

DEWATERING EQUIPMENT, Sand (see Sand Recovery Machinery)

DIAPHRAGMS, Pumps, Rubber

CARLYLE RUBBER CO., INC., 62-66 Park Pl., New York 7, N. Y.

CONSTRUCTION MACHINERY CO.'S, Glenwood & Vinton Sts., Waterloo, Iowa

CONTINENTAL RUBBER CO., 1999 Liberty Blvd., Erie, Pa.

•DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

•GOODALL RUBBER CO., Whitehead Road, Trenton 4, N. J.

HAMILTON RUBBER MFG. CORP., Mead St., Trenton 3, N. J.

E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa.

QUAKER RUBBER CORP., Tacony & Comly Sts., Philadelphia 24, Pa.

RAYBESTOS-MANHATTAN, INC., 61 Willett St., Passaic, N. J.

UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

DIESEL ENGINES, Automotive

THE BUDA COMPANY, 154th & Commercial, Harvey, Ill.

•CATERPILLAR TRACTOR CO., Peoria 8, Ill.

CONTINENTAL MOTORS CORP., 20 S. Market St., Muskegon, Mich.

THE COOPER-BESSEMER CORP., Mount Vernon, Ohio

•CUMMINS ENGINE CO., INC., Fifth & Union Sts., Columbus, Ind.

•DETROIT DIESEL ENGINE DIV., GENERAL MOTORS CORP., 13400 W. Outer Dr., Detroit 28, Mich.

HERCULES MOTORS CORP., 101 Eleventh St., S. E., Canton 2, Ohio

LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP., South Main St., Lima, Ohio

•MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.

MURPHY DIESEL CO., 5317 W. Burnham St., Milwaukee 14, Wis.

PAGE ENGINEERING CO., Clearing P.O., Chicago 38, Ill.

SHEPARD DIESELS, Philadelphia 31, Hanover, Pa.

WAUKESHA MOTOR CO., Box 379, Waukesha, Wis.

DIESEL ENGINES, Stationary

1. Less than 100 H.P.
2. 100-500 H.P.
3. 500-1000 H.P.
4. Over 1000 H.P.

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.

•THE BALDWIN LOCOMOTIVE WORKS, Philadelphia 42, Pa.

2-3-4 THE BUDA COMPANY, 154th & Commercial, Harvey, Ill.

1-2 •CATERPILLAR TRACTOR CO., Peoria 8, Ill.

1-2-3-4 •CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.

2-3-4 CONTINENTAL MOTORS CORP., 20 S. Market St., Muskegon, Mich.

1-2 THE COOPER-BESSEMER CORP., Mount Vernon, Ohio

2-3 CUMMINS ENGINE CO., INC., Fifth & Union Sts., Columbus, Ind.

2-3 •DETROIT DIESEL ENGINE DIV., GENERAL MOTORS CORP., 13400 W. Outer Dr., Detroit 28, Mich.

1-2-3 ENTERPRISE ENGINE & MACHINERY CO., 18th and Florida Sts., San Francisco 10, Calif.

1-2-3-4 FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

1-2-3-4 •HARNISCHFGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

1-2 HERCULES MOTORS CORP., 101 Eleventh St., S. E., Canton 2, Ohio

1-2 INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

2-3-4 •INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.

LISTER BLACKSTONE INC., 420 Lexington Ave., New York 17, N. Y.

1-2-3 LORIMER ENGINE DIV., ATLAS IMPERIAL DIESEL ENGINE CO., 1000 19th Ave., Oakland 6, Calif.

1-2 MURPHY DIESEL CO., 5317 W. Burnham St., Milwaukee 14, Wis.

1-2 •NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.

1-2-3-4

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

SHEPPARD DIESELS, Philadel-
phia St., Hanover, Pa.

WAUKESHA MOTOR CO., Box
379, Waukesha, Wis.

**WITTE ENGINE WORKS, DIV.
OF OIL WELL SUPPLY CO.**, 1600
Oakland Ave., Kansas City 3,
Mo.

**WORTHINGTON PUMP & MA-
CHINERY CORP.**, Worthington
Ave., Harrison, N. J.

**DIPPER TEETH AND
PARTS (see Bucket Lips
& Teeth)**

**DIPPERS, Dredge &
Shovel (see Buckets)**

DRAFT GAUGES

BAILEY METER CO., 1050 Ivan-
hoe Road, Cleveland 10, Ohio

THE BRISTOL CO., Waterbury
20, Conn.

ELLISON DRAFT GAGE CO., 214
W. Kinzie St., Chicago 10, Ill.

THE HAYS CORP., East 8th St.,
Michigan City, Ind.

**MINNEAPOLIS - HONEYWELL
REGULATOR CO.**, Brown In-
struments Div., Wayne and
Roberts Aves., Philadelphia 44,
Pa.

DRAGLINE CABLEWAY EXCAVATORS

ATLAS CORPORATION, Mount-
ville, Pa.

HARNISCHFGER CORP., 4400
W. National Ave., Milwaukee
14, Wis.

SAUERMAN BROS. INC., 530 S.
Clinton St., Chicago 7, Ill.

**SUPERIOR-LIDGERWOOD-MUN-
DY CORP.**, Superior, Wis.

TRIANGLE ENGINEERING CO.,
2448 W. 26th St., Chicago 23,
Ill.

DRAG LINES, Crawler

1. Diesel
2. Electric
3. Gasoline

AUSTIN-WESTERN CO., Aurora,
Ill.

BAY CITY SHOVELS, INC., Bay
City, Mich.

**THE BROWNING CRANE &
SHOVEL CO.**, 16226 Waterloo
Road, Cleveland 10, Ohio

BUCHYRUS-ERIE CO., South Mil-
waukee, Wis.

THE BYERS MACHINE CO., Lock
Box 390, Ravenna, Ohio

**THE HANSON CLUTCH & MA-
CHINERY CO.**, Wall & Miami
Sts., Tiffin 15, Ohio

HARNISCHFGER CORP., 4400
W. National Ave., Milwaukee 14,
Wis.

INSLEY MFG. CORP., 801 N.
Olney, Indianapolis 1, Ind.

KOENHING CO., 3026 W. Con-
cordia Ave., Milwaukee 16, Wis.

**LIMA SHOVEL & CRANE DIV.
OF BALDWIN-LIMA-HAMILTON
CORP.**, South Main St., Lima,
Ohio

LINK-BELT SPEEDER CORP.,
1201 Sixth St., S. W., Cedar
Rapids, Iowa

**MANITOWOC ENGINEERING
WORKS**, Manitowoc, Wis.

MARION POWER SHOVEL CO.,
617 W. Center St., Marion, Ohio

MICHIGAN POWER SHOVEL CO.,
250 Miller Road, Benton Harbor,
Mich.

NORTHWEST ENGINEERING CO.,
135 S. LaSalle St., Chicago 3,
Ill.

THE OSGOOD CO., Marion, Ohio

THE THEW SHOVEL CO., 1000
E. 28th St., Lorain, Ohio

UNIT CRANE & SHOVEL CORP.,
6411 W. Burnham St., Milwaukee
14, Wis.

**WAYNE CRANE DIV. AMER-
ICAN STEEL DREDGE CO., INC.**,
P. O. Box 570, Fort Wayne 1,
Ind.

WESTERN MACHINERY CO.,
760-766 Folsom St., San Fran-
cisco 7, Calif.

DRAGLINES, Truck Mounted

BAY CITY SHOVELS, INC., Bay
City, Mich.

**THE BROWNING CRANE &
SHOVEL CO.**, 16226 Waterloo
Road, Cleveland 10, Ohio

BUCHYRUS-ERIE CO., South Mil-
waukee, Wis.

THE BYERS MACHINE CO., Lock
Box 390, Ravenna, Ohio

**THE HANSON CLUTCH & MA-
CHINERY CO.**, Wall & Miami
Sts., Tiffin 15, Ohio

HARNISCHFGER CORP., 4400
W. National Ave., Milwaukee 14,
Wis.

INSLEY MFG. CORP., 801 N.
Olney, Indianapolis 1, Ind.

KOENHING CO., 3026 W. Con-
cordia Ave., Milwaukee 16, Wis.

**LIMA SHOVEL & CRANE DIV.
OF BALDWIN-LIMA-HAMILTON
CORP.**, South Main St., Lima,
Ohio

LINK-BELT SPEEDER CORP.,
1201 Sixth St., S. W., Cedar
Rapids, Iowa

MICHIGAN POWER SHOVEL CO.,
250 Miller Road, Benton Harbor,
Mich.

NORTHWEST ENGINEERING CO.,
135 S. LaSalle St., Chicago 3, Ill.

THE OSGOOD CO., Marion, Ohio

**"QUICK-WAY" TRUCK SHOVEL
CO.**, 2401 E. 40th Ave., Denver
5, Colo.

SCHILD BANTAM CO., 216
Park St., Waverly, Iowa

THE THEW SHOVEL CO., 1000
E. 28th St., Lorain, Ohio

UNIT CRANE & SHOVEL CORP.,
6411 W. Burnham St., Milwaukee
14, Wis.

**WAYNE CRANE DIV. AMER-
ICAN STEEL DREDGE CO., INC.**,
P. O. Box 570, Fort Wayne 1,
Ind.

WESTERN MACHINERY CO.,
760-766 Folsom St., San Fran-
cisco 7, Calif.

DRAGLINES, Walking

1. Diesel
2. Electric
3. Gasoline
4. Electric Generator

BUCHYRUS-ERIE CO., South Mil-
waukee, Wis.

LINK-BELT SPEEDER CORP.,
1201 Sixth St., S. W., Cedar
Rapids, Iowa

MARION POWER SHOVEL CO.,
617 W. Center St., Marion, Ohio

PAGE ENGINEERING CO., Clear-
ing P. O., Chicago 38, Ill.

DRAGS, Sand (see Sand Recovery Machinery)

DREDGE HOISTS

**AMERICAN HOIST & DERRICK
CO.**, 63 S. Robert St., St. Paul 1,
Minn.

CLYDE IRON WORKS, INC.,
P. O. Box 370, Duluth 1, Minn.

ELLCOTT MACHINE CORP.,
1611 Bush St., Baltimore 30, Md.

GEORGIA IRON WORKS CO.,
605 12th St., Augusta, Ga.

GREENVILLE MFG. WORKS,
Greenville, Ohio

McKIERNAN-TERRY CORP., 505
Monor Ave., Harrison, N. J.

MORRIS MACHINE WORKS,
Baldwinsville, N. Y.

**SUPERIOR - LIDGERWOOD -
MUNDY CORP.**, 7 Day St., New
York 7, N. Y.

DREDGE PIPE AND FIT- TINGS

**AMERICAN MANGANESE STEEL
DIV. OF AMERICAN BRAKE
SHOE CO.**, 377 E. 14th St., Chi-
cago Heights, Ill.

**AMERICAN STEEL DREDGE CO.
INC.**, 2511 Taylor St., Fort
Wayne 6, Ind.

**BIRDSBORO STEEL FOUNDRY &
MACHINE CO.**, Birdsboro, Pa.

ELECTRIC STEEL FOUNDRY CO.,
2141 N. W. 25th Ave., Portland
10, Oreg.

ELLCOTT MACHINE CORP.,
1611 Bush St., Baltimore 30, Md.

ERIE PUMP & ENGINE WORKS,
145 Glenwood Ave., Medina, N.
Y.

THE FLORI PIPE CO., 629 E.
Redbud Ave., St. Louis 15, Mo.

**THE FROG, SWITCH & MFG.
CO.**, Carlisle, Pa.

**HETHERINGTON & BERNER,
INC.**, 701-745 Kentucky Ave.,
Indianapolis 7, Ind.

KANSAS CITY HAY PRESS CO.,
801 Woodswether Road, Kan-
sas City 6, Mo.

MANGANESE STEEL FORGE CO.,
Richmond St. & Castor Ave.,
Philadelphia 34, Pa.

MECKUM ENGINEERING, INC.,
Dayton Rd., Ottawa, Ill.

MORRIS MACHINE WORKS,
Baldwinsville, N. Y.

TAYLOR FORGE & PIPE WORKS,
P. O. Box 485, Chicago 90, Ill.

DREDGE PIPE SLEEVES

**AMERICAN STEEL DREDGE CO.
INC.**, 2511 Taylor St., Fort
Wayne 6, Ind.

CARLEY RUBBER CO., INC.,
62-66 Park Pl., New York 7, N.
Y.

ELECTRIC STEEL FOUNDRY CO.,
2141 N. W. 25th Ave., Portland
10, Oreg.

ELLCOTT MACHINE CORP.,
1611 Bush St., Baltimore 30, Md.

THE FLORI PIPE CO., 629 E.
Redbud Ave., St. Louis 15, Mo.

THE FROG, SWITCH & MFG. CO.,
Carlisle, Pa.

GOODALL RUBBER CO., White-
head Road, Trenton 4, N. J.

**THE GOODYEAR TIRE & RUB-
BER CO., INC.**, 1144 E. Market
St., Akron 16, Ohio

**HETHERINGTON & BERNER,
INC.**, 701-745 Kentucky Ave.,
Indianapolis 7, Ind.

**HEWITT RUBBER DIV. HEWITT-
ROBINS INC.**, 240 Kensington
Ave., Buffalo 5, N. Y.

MECKUM ENGINEERING, INC.,
Dayton Rd., Ottawa, Ill.

MORRIS MACHINE WORKS,
Baldwinsville, N. Y.

QUAKER RUBBER CORP., Tacony
& Comly Sts., Philadelphia 24,
Pa.

RAYBESTOS-MANHATTAN, INC.,
61 Willett St., Passaic, N. J.

THERMOID CO., Trenton, N. J.

UNITED STATES RUBBER CO.,
1230 Ave. of the Americas, New
York 20, N. Y.

DREDGE PUMPS (see Pumps, Dredge)

DREDGES, Sand & Gravel

1. Bucket
2. Ladder
3. Pump

**AMERICAN STEEL DREDGE CO.,
INC.**, 2511 Taylor St., Fort
Wayne 6, Ind.

**AMERICAN MANGANESE STEEL
DIV. OF AMERICAN BRAKE
SHOE CO.**, 377 E. 14th St., Chi-
cago Heights, Ill.

BAER STEEL PRODUCTS, INC.,
P. O. Box 497, Auburn, Wash.

BODINSON MFG. CO., 2401 Bay-
shore Blvd., San Francisco 24,
Calif.

BUCHYRUS-ERIE CO., South Mil-
waukee, Wis.

EAGLE IRON WORKS, 137 Hol-
comb Ave., Des Moines 4, Iowa

ELECTRIC STEEL FOUNDRY CO.,
2141 N. W. 25th Ave., Portland
10, Oreg.

ELLCOTT MACHINE CORP.,
1611 Bush St., Baltimore 30, Md.

ERIEPUMP AND ENGINE WORKS,
145 Glenwood Ave., Medina,
N. Y.

GEORGIA IRON WORKS CO.,
605 12th St., Augusta, Ga.

GREENVILLE MFG. WORKS,
Greenville, Ohio

**HETHERINGTON & BERNER
INC.**, 701-745 Kentucky Ave.,
Indianapolis 7, Ind.

**MANITOWOC ENGINEERING
WORKS**, Manitowoc, Wis.

MECKUM ENGINEERING, INC.,
Dayton Rd., Ottawa, Ill.

MILLVILLE IRON WORKS, INC.,
6th St. & Florence Ave., Mill-
ville, N. J.

MORRIS MACHINE WORKS,
Baldwinsville, N. Y.

STRAUB MFG. CO., 507 Chest-
nut St., Oakland 7, Calif.

YUBA MFG. CO., 351 California
St., San Francisco 4, Calif.

DRIFTERS

**CHICAGO PNEUMATIC TOOL
CO.**, 6 E. 44th St., New York 17,
N. Y.

GARDNER-DENVER CO., Quincy,
Ill.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

DRILL BITS (see Bits)

DRILL STEEL

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

• **GARDNER-DENVER CO.**, Quincy, Ill.

HARDSOGG PNEUMATIC TOOL CO., 225 So. Benton St., Ottumwa, Iowa

INGERSOLL - RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

ROCK BIT SALES & SERVICE CO., 2514 E. Cumberland St., Philadelphia 25, Pa.

• **JOSEPH T. RYERSON & SON, INC.**, 2558 West 16th St., Chicago 80, Ill.

SCHRAMM INC., West Chester, Pa.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

DRILLING ACCESSORIES

• **BUCRYRUS-ERIE CO.**, South Milwaukee, Wis.

• **CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.

THE SIMCO CORP., P. O. Box 300, Salt Lake City 10, Utah

• **GARDNER-DENVER CO.**, Quincy, Ill.

INDEPENDENT PNEUMATIC TOOL CO., 175 State St., Aurora, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

KEYSTONE DRILLER CO., 8th Ave., Beaver Falls, Pa.

• **MACWHYTE CO.**, 2949 14th Ave., Kenosha, Wis.

SCHRAMM INC., West Chester, Pa.

SPRAGUE & HENWOOD, INC., 221 W. Olive St., Scranton 2, Pa.

WALL ROPE WORKS, INC., 48 South St., New York 5, N. Y.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

• **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

DRILLING CABLE, Manila, Sisal, etc.

JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.

THE SANDERSON CYCLONE DRILL CO., 157 S. Main St., Orrville, Ohio

DRILLS, Core

ACKER DRILL CO., INC., 725 W. Lackawanna Ave., Scranton 3, Pa.

• **CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

E. J. LONGYEAR CO., 1701 Foshay Tower, Minneapolis 2, Minn.

SPRAGUE & HENWOOD, INC., 221 W. Olive St., Scranton 2, Pa.

DRILLS, Rock

1. Electric
2. Gasoline
3. Pneumatic

BARCO MANUFACTURING CO., 1801-1815 Winnemac Ave., Chicago 40, Ill.

• **BUCRYRUS-ERIE CO.**, South Milwaukee, Wis.

• **CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.

• **GARDNER-DENVER CO.**, Quincy, Ill.

HARDSOGG PNEUMATIC TOOL CO., 225 So. Benton St., Ottumwa, Iowa

• **HOSSFELD MFG. CO.**, Winona, Minn.

INDEPENDENT PNEUMATIC TOOL CO., 175 State St., Aurora, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **LEROI CO.**, 1706 So. 68th St., Milwaukee, Wis.

• **SALEM TOOL CO.**, 700 S. Ellsworth St., Salem, Ohio

SANDVIK STEEL, INC., 111 Eighth Ave., New York 11, N. Y.

SCHRAMM INC., West Chester, Pa.

SPRAGUE & HENWOOD, INC., 221 W. Olive St., Scranton 2, Pa.

• **SYNTRON CO.**, 450 Lexington Ave., Homer City, Pa.

WARSPOR POWER TOOLS, INC., 347 N. 12th St., Philadelphia 7, Pa.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

• **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

DRILLS, Stoper

• **CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.

• **GARDNER-DENVER CO.**, Quincy, Ill.

INDEPENDENT PNEUMATIC TOOL CO., 175 State St., Aurora, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

THE SANDERSON CYCLONE DRILL CO., 157 S. Main St., Orrville, Ohio

SANDVIK STEEL, INC., 111 Eighth Ave., New York 11, N. Y.

SCHRAMM INC., West Chester, Pa.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

• **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

DRILLS, Well or Blast-Hole

ACKER DRILL CO., INC., 725 W. Lackawanna Ave., Scranton 3, Pa.

• **BUCRYRUS-ERIE CO.**, South Milwaukee, Wis.

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.

HOSSFELD MFG. CO., Winona, Minn.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

• **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

KEYSTONE DRILLER CO., 8th Ave., Beaver Falls, Pa.

THE LOOMIS MACHINE CO., 15 E. Market St., Tiffin, Ohio

SALEM TOOL CO., 700 S. Ellsworth St., Salem, Ohio

THE SANDERSON CYCLONE DRILL CO., 157 S. Main St., Orrville, Ohio

SANDVIK STEEL, INC., 111 Eighth Ave., New York 11, N. Y.

SPRAGUE & HENWOOD, INC., 221 W. Olive St., Scranton 2, Pa.

STAR DRILLING MACHINE CO., 474 Washington St., Akron 11, Ohio

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

DRIVES

1. Chain
2. Flat Belt
3. Flexible Shaft
4. Gear
5. Short Center
6. Variable Speed
7. V-Belt

AJAX FLEXIBLE COUPLING CO., INC., Westfield, N. Y.

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

• **AMERICAN FLEXIBLE COUPLING CO.**, Pittsburgh Ave., Erie, Pa.

THE AMERICAN PULLEY CO., 4200 Wissachonka Ave., Philadelphia 29, Penna.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

• **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.

• **CARLYLE RUBBER CO., INC.**, 62-65 Park Pl., New York 7, N. Y.

• **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wis.

THE CLEVELAND WORM & GEAR CO., 3249 E. Eightieth St., Cleveland 4, Ohio

• **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.

THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.

• **COOK BROS. EQUIPMENT CO.**, 1815 N. Broadway, Los Angeles 31, Calif.

• **CROCKER-WHEELER ELECTRIC MFG. CO. DIV. OF ELLIOTT CO.**, Amper, N. J.

• **THE DAYTON RUBBER CO.**, Dayton 1, Ohio

DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

• **DIAMOND CHAIN CO., INC.**, 402 Kentucky Ave., Indianapolis 7, Ind.

• **DIAMOND IRON WORKS, INC.**, 1728 2nd St. No., Minneapolis 11, Minn.

• **DODGE MANUFACTURING CORP.**, Mishawaka, Ind.

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

• **EATON MANUFACTURING CO.**, 739 E. 140 St., Cleveland 10, Ohio

• **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.

• **ELECTRIC MACHINERY MFG. CO.**, 1331 Tyler St., N.E., Minneapolis 14, Minn.

• **THE FALK CORP.**, 3001 W. Canal St., Milwaukee 8, Wis.

• **FARREL - BIRKINGHAM, INC.**, Ansonia, Conn.

• **FOOTE BROS. GEAR & MACHINE CO.**, 4545 S. Western Blvd., Chicago 9, Ill.

• **THE GATES RUBBER CO.**, 999 S. Broadway, Denver 17, Colo.

• **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

• **GRAHAM TRANSMISSIONS INC.**, 3754 N. Holton St., Milwaukee 12, Wis.

• **E. F. HOUGHTON & CO.**, 303 W. Lehigh Ave., Philadelphia 33, Pa.

• **IOWA MFG. CO.**, 916-16th St., N.E., Cedar Rapids, Iowa

• **D. O. JAMES MFG. CO.**, 1114 W. Monroe St., Chicago 7, Ill.

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

• **W. A. JONES FOUNDRY & MACHINE CO.**, 4401 Roosevelt Rd., Chicago 24, Ill.

KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.

• **KOPPERS CO. INC.**, Koppers Bldg., Pittsburgh 19, Pa.

• **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

• **LOVEJOY FLEXIBLE COUPLING CO.**, 5009 W. Lake St., Chicago 44, Ill.

• **E. F. MARSH ENG. CO.**, 4324 W. Clayton Ave., St. Louis 10, Mo.

• **MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.

• **THE MEDART CO.**, 100 Potomac St., St. Louis 13, Mo.

• **MORSE CHAIN CO.**, 7601 Central Ave., Detroit 8, Mich.

• **MCCALL - PITTSBURG MFG. CORP.**, Pittsburg, Kans.

• **PHILADELPHIA GEAR WORKS**, Erie Ave. & G St., Philadelphia, Pa.

• **REEVES PULLEY CO.**, Columbus, Ind.

• **RELANCE ELECTRIC & ENGINEERING CO.**, 1088 Ivanhoe Rd., Cleveland 10, Ohio

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DIRECTORY

J. R. RHODES & SONS, 35 N. 6th St., Philadelphia 6, Pa.

2-5
*SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

1-2-3-4-5-6-7
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

4-6-7
STERLING ELECTRIC MOTORS, INC., 5401 Anaheim-Telegraph Road, Los Angeles 22, Calif.

4-6
STOW MANUFACTURING CO., 49 Shear St., Binghamton, N. Y.

3
TULSA WINCH DIV. OF VICKERS, INC., 815 E. 1st St., Tulsa 3, Okla.

4-6
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

1-2-3-4-7
U. S. ELECTRICAL MOTORS INC., 200 E. Slauson Ave., Los Angeles 54, Calif.

4-6
*VULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.

JOHN WALDRON CORP., River Road, New Brunswick, N. J.

1
WORTHINGTON ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

4-6
*WITTMANN MACHINERY CO., Paynter Road, Farmingdale, N. J.

1-2-7
*WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

4-6-7

DROP BALLS

*CAPE ANN ANCHOR & FORGE CO., Whittemore St., Gloucester, Mass.

FREDERICK IRON & STEEL CO., Frederick, Md.

*TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

DRY PANS

THE BONHOT CO., 722 Mulberry St., Canton 2, Ohio

*EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

THE EIMCO CORP., P. O. Box 300, Salt Lake City 8, Utah

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

*McLANAHAN AND STONE CORP., Hollidaysburg, Pa.

*W. A. RIDDELL CORP., Bucyrus, Ohio

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

DRYERS, Rotary, Gravel, Rock, Sand

*ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

THE BONHOT CO., 722 Mulberry St., Canton 2, Ohio

CENTRIFUGE MECHANICAL EQPT., INC., 95 River St., Hoboken, N. J.

*DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

*DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.

THE EIMCO CORP., P. O. Box 300, Salt Lake City 10, Utah

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg., Room 3105, 145 So. LaSalle St., Chicago 90, Ill.

*HARDINGE CO., INC., 240 Arch St., York, Pa.

HETHERINGTON & BERNER, INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.

W. P. HEINEKEN CO., 227 Fulton St., New York 7, N. Y.

ROBERT HOLMES & BROS. INC., 3519 Junction Ave., Danville, Ill.

INDIANA FOUNDRY CO., 150 Clymer Ave., Indiana, Pa.

*IOWA MFG. CO., 916 16th St., N.E., Cedar Rapids, Iowa

*KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

*LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

MADSEN ENG. WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.

McDERMOTT BROS. CO., Ft. of Washington St., Allentown, Pa.

*McLANAHAN AND STONE CORP., Hollidaysburg, Pa.

NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.

*NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wisc.

NOVERA INC., 420 Lexington Ave., New York 17, N. Y.

THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

*PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

POSEY IRON WORKS, INC., INDUSTRIAL HEATING DIV., 560 S. Prince St., Lancaster, Pa.

SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.

*TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

*VULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.

DRYERS, Plaster Board

CENTRIFUGE MECHANICAL EQPT., INC., 95 River St., Hoboken, N. J.

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg., Room 3105, 145 So. LaSalle St., Chicago 90, Ill.

*HARDINGE CO., INC., 240 Arch St., York, Pa.

MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.

NOVERA INC., 420 Lexington Ave., New York 17, N. Y.

DUMPING MECHANISMS, Truck

ANTHONY COMPANY, Streator, Ill.

DEMPEST BROTHERS, INC., Springdale St., Knoxville 17, Tenn.

EASTON CAR & CONSTRUCTION CO., Easton, Pa.

GAR WOOD INDUSTRIES, INC., Wayne Div., Wayne, Mich.

KEWANEE MANUFACTURING CO., Department RP, Kewanee, Ill.

*KOENHING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.

THE MARION METAL PRODUCTS CO., Cheney Ave. & Otis St., Marion, Ohio

THE PERFECTION STEEL BODY CO., S. East St., Gollon, Ohio

SCHONROCK EQUIPMENT MFG. CO., P.O. Box 1543, San Angelo, Texas

DUST COLLECTING EQUIPMENT ACCESSORIES

AMERICAN BLOWER CORP., Box 58 Roosevelt Annex, Detroit 32, Mich.

AMERICAN VENTILATING HOSE CO., 15 Park Row, New York 7, N. Y.

AMERICAN WHEELABRATOR & EQUIP. CORP., 439 S. Byrkit St., Mishawaka, Ind.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BEAUMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.

BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.

THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.

CLARK DUST CONTROL CO., 210 N. Mozart St., Chicago 12, Ill.

*IOWA MFG. CO., 916 16th St. N.E., Cedar Rapids, Iowa

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

THE MACLEOD CO., 2232-40 Bogen St., Cincinnati 22, Ohio

THE NORTHERN BLOWER CO., 6408 Barberston Ave., Cleveland 2, Ohio

PANGBORN CORP., Hagerstown, Md.

*PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

RESEARCH CORP., 405 Lexington Ave., New York 17, N. Y.

*THE W. W. SLY MFG. CO., 4700 Train Ave., Cleveland 2, Ohio

WESTERN PRECIPITATION CORP., 1016 West Ninth St., Los Angeles 15, Calif.

WHITING CORP., 15693 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS

1. Bag Type
2. Cyclone
3. Electric Precipitators
4. Hydraulic
5. Portable

*ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

AMERICAN AIR FILTER CO., INC., 215 Central Ave., Louisville 8, Ky.

1-4-5
AMERICAN BLOWER CORP., Box 58 Roosevelt Annex, Detroit 32, Mich.

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 439 S. Byrkit St., Mishawaka, Ind.

2
BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.

2-5
THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

2-4

BEAUMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.

2-4
*BEMIS BRO. BAG CO., 408 Pine St., St. Louis 2, Mo.

1
BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.

1-2
BUELL ENGINEERING CO., INC., 70 Pine St., New York 5, N. Y.

2-3
THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.

1-2
*IOWA MFG. CO., 916 16th St. N.E., Cedar Rapids, Iowa

2-5
THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

2-5
KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

3
THE MACLEOD CO., 2232-40 Bogen St., Cincinnati 22, Ohio

1
MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

2
JAMES H. MARKLEY, 80 Snyder Road, Ramsey, N. J.

*MULTIPLEX MACHINERY CORP., Elmore, Ohio

1-5
THE NORTHERN BLOWER CO., 6408 Barberston Ave., Cleveland 2, Ohio

1-2-4-5
PANGBORN CORP., Hagerstown, Md.

1-2-5
THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

*PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

2-5
PULVERIZING MACHINERY CO., Chatham Road, Summit, N. J.

1
RESEARCH CORP., 405 Lexington Ave., New York 17, N. Y.

RUEMELIN MFG. CO., 3832 N. Palmer St., Milwaukee 12, Wis.

1
SCHMIDT INDUSTRIES, INC., 308 Piquette, Detroit 2, Mich.

2-4
CLAUDE B. SCHNEIBLE CO., 2827 25th St., Detroit 16, Mich.

SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.

2
THE W. W. SLY MFG. CO., 4700 Train Ave., Cleveland 2, Ohio

WESTERN PRECIPITATION CORP., 1016 West Ninth St., Los Angeles 15, Calif.

2-3
*WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.

DUST COLLECTORS, Rock Drill

JAMES H. MARKLEY, 80 Snyder Road, Ramsey, N. J.

DUST SAMPLING AND ANALYZING EQUIPMENT

WESTERN PRECIPITATION CORP., 1016 West Ninth St., Los Angeles 15, Calif.

WILLSON PRODUCTS, INC., 248 Washington St., Reading, Pa.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

DYNAMITE AND BLASTING EXPLOSIVES (see Explosives and Dynamite)

E

EARTH MOVING HAULAGE EQUIPMENT, Self Loading

- **ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION**, P. O. Box 512, Milwaukee 1, Wis.
- **BUCYRUS-ERIE CO.**, South Milwaukee, Wis.
- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
- **THE EMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah
- **THE EUCLID ROAD MCHNRY. CO.**, 1361 Chardon Road, Cleveland 17, Ohio
- **THE HEIL CO.**, 3000 W. Montana St., Milwaukee 1, Wis.
- **HENNEUSE ENGINEERING CO.**, Marion, Ohio
- **THE FRANK G. HOUGH CO.**, Sunnyside Ave., Libertyville, Ill.
- **LAPLANT-CHOATE MFG. CO., INC.**, 2920 1st Ave. N.E., Cedar Rapids, Iowa
- **R. G. LÉTOURNEAU, INC.**, 2301 N. Adams St., Peoria, Ill.
- **LULL MFG. CO.**, 3612 E. 44th St., Minneapolis 6, Minn.
- **M-R-S MANUFACTURING CO.**, P.O. Box 356, Florio, Miss.
- **SAUERMAN BROS. INC.**, 530 S. Clinton St., Chicago 7, Ill.
- **SOUTHWEST WELDING & MFG. CO.**, 3201 W. Mission Road, Alhambra, Calif.
- **TRACTOMOTIVE CORP.**, County Line Road, Deerfield, Ill.
- **TRACKSON COMPANY**, 3333 S. Chose Ave., Milwaukee 7, Wis.
- **WOOLDRIDGE MFG. CO.**, Sunnyvale, Calif.

ECONOMIZERS, Waste Heat (see Boilers, Waste Heat)

ELECTRIC MOTORS

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **THE LOUIS ALLIS CO.**, 427 E. Stewart St., Milwaukee 7, Wis.
- **B. F. M. INDUSTRIES INC.**, 2124 Mill Ave., Brooklyn 34, N. Y.
- **CENTURY ELECTRIC CO.**, 1806 Pine St., St. Louis 3, Mo.
- **CROCKER-WHEELER ELECTRIC MFG. CO., DIV. OF ELLIOTT CO.**, Amper, N. J.
- **ELECTRIC MACHINERY MFG. CO.**, 1331 Tyler St. N.E., Minneapolis 14, Minn.
- **FAIRBANKS MORSE & CO.**, 600 S. Michigan Ave., Chicago 5, Ill.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **KATO ENGINEERING CO.**, 108 Maxfield St., Mankato, Minn.
- **RELIANCE ELECTRIC & ENGINEERING CO.**, 1068 Ivanhoe Rd., Cleveland 10, Ohio
- **STERLING ELECTRIC MOTORS, INC.**, 5401 Anaheim-Telegraph Road, Los Angeles 22, Calif.
- **U. S. ELECTRICAL MOTORS INC.**, 200 E. Slauson Ave., Los Angeles 54, Calif.
- **WAGNER ELECTRIC CORP.**, 6400 Plymouth Ave., St. Louis 14, Mo.
- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

ELECTRIC SWITCH GEAR

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **ELECTRIC MACHINERY MFG. CO.**, 1331 Tyler St. N.E., Minneapolis 14, Minn.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **INTERNATIONAL DIESEL ELECTRIC CO., INC.**, 13-02 44th Ave., Long Island City 1, N. Y.
- **I-T-E CIRCUIT BREAKER CO.**, 19th and Hamilton St., Philadelphia 30, Pa.
- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

ELECTRIC TRANSFORMERS

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **WAGNER ELECTRIC CORP.**, 6400 Plymouth Ave., St. Louis 14, Mo.
- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

ELECTRIC EQUIPMENT AND SUPPLIES

- **ALBERT & I. M. ANDERSON MFG. CO.**, 289-305 A St., Boston 10, Mass.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

ELECTRODES, WELDING (see Welding Rods and Electrodes)

ELEVATORS, Chain or Belt & Bucket

- **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio
- **ANDERSON ENGINEERING CO.**, 237 Bent St., Cambridge 41, Mass.
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **"THE C. O. BARTLETT" AND SNOW CO.**, 6200 Harvard Ave., Cleveland 5, Ohio
- **BAUGHMAN MFG. CO., INC.**, Jerseyville, Ill.
- **BEAUMONT BIRCH CO.**, 1503 Race St., Philadelphia 2, Pa.
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **BOSTON WOVEN ROPE & RUBBER CO.**, P. O. Box 1071, Boston 3, Mass.
- **THE BRADY CONVEYORS CORP.**, 20 W. Jackson Blvd., Chicago 4, Ill.
- **L. BURMEISTER CO.**, 4539 W. Mitchell St., Milwaukee 14, Wis.
- **BUTLER BIN CO.**, Box 407, Waukesha, Wis.
- **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wis.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P.O. Box 673, Connelville, Pa.
- **CONSTRUCTION MACHINERY CO'S.**, Glenwood & Vinton Sts., Waterloo, Iowa

- **CONTINENTAL CIN CO.**, P. O. Box 2614, Birmingham, Ala.
- **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.
- **COYLE & ROTH**, 3024 4th St. S.E., Minneapolis 14, Minn.
- **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
- **EAGLE CRUSHER CO., INC.**, 900 Harding Way E., Gallion, Ohio
- **THE J. B. EHRMAN & SONS MFG. CO.**, Enterprise, Kans.
- **ERIE STEEL CONST. CO.**, Giest Road & N. P. R. R., Erie, Pa.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **GIFFORD-WOOD CO.**, 1 Hudson Ave., Hudson, N. Y.
- **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.
- **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
- **GEORGE HAISS MFG. CO.**, Park Ave. & 143rd St., New York 51, N. Y.
- **GREENVILLE MFG. WORKS**, Greenville, Ohio
- **HARDY SCALES CO.**, 5701 So. Atlantic Blvd., Maywood, Calif.
- **THE HELTZEL STEEL FORM AND IRON CO.**, 1750 Thomas Road, Warren, Ohio
- **ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC.**, 270 Passaic Ave., Passaic, N. J.
- **ROBERT HOLMES & BROS. INC.**, 3519 Junction Ave., Danville, Ill.
- **IOWA MFG. CO.**, 916 16th St. N.E., Cedar Rapids, Iowa
- **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
- **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **FRANK A. KREMSER & SONS, INC.**, 3435-45 N. 5th St., Philadelphia 40, Pa.
- **LANDIS STEEL CO.**, 116 W. A St., Picher, Okla.
- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **MADSEN IRON WORKS, INC.**, 5631 Bickett St., Huntington Park, Calif.
- **E. F. MARSH ENG. CO.**, 4324 W. Clayton Ave., St. Louis 10, Mo.
- **MCHALLY PITTSBURGH MFG. CORP.**, Pittsburgh, Kans.
- **LESLIE C. MILLER SUPPLY INC.**, P. O. Box 7, Bedford, Ohio
- **McLANAHAN AND STONE CORP.**, Hollidaysburg, Pa.
- **NOBLE CO.**, 1860 Seventh St., Oakland 20, Calif.
- **NORTHERN CONVEYOR CO.**, 327 W. State St., Jonesville, W. Va.
- **O. K. CLUTCH & MCHNRY. CO.**, Florence St., Columbia, Pa.
- **PIONEER ENG. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
- **FRASCHAK MACHINE CO.**, Marshfield, Wis.
- **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.
- **SPOUT, WALDRON & CO., INC.**, Muncy, Pa.
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

- **STURTEVANT MILL CO.**, 102 Clayton St., Boston 22, Mass.
- **TRIANGLE ENGINEERING CO.**, 2848 W. 26th St., Chicago 23, Ill.
- **TROWBRIDGE CONVEYOR CO.**, 851 Van Houten Ave., Clifton, N. J.
- **UNIT CRANE & SHOVEL CORP.**, 5411 W. Burnham St., Milwaukee 14, Wis.
- **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.
- **UNIVERSAL ENGINEERING CORP.**, 625 C Ave. N.W., Cedar Rapids, Iowa
- **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N. Y.
- **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.
- **WEBSTER MFG. INC.**, Tiffin 16, Ohio
- **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 N. Broadway, St. Louis 6, Mo.
- **WITTMANN MACHINERY CO.**, Painters Road, Farmingdale, N. J.

ELEVATORS, Bulk Cement

- **ANDERSON ENGINEERING CO.**, 237 Bent St., Cambridge 41, Mass.
- **BEAUMONT-BIRCH CO.**, 1509 Race St., Philadelphia, Penna.
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **BUTLER BIN CO.**, Box 407, Waukesha, Wis.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONNELLSVILLE MFG. & MINE SUPPLY CO.**, P.O. Box 673, Connelville, Pa.
- **CONSTRUCTION MACHINERY CO'S.**, Glenwood & Vinton Sts., Waterloo, Iowa
- **CONTINENTAL CIN CO.**, P. O. Box 2614, Birmingham, Ala.
- **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.
- **DRAVO CORPORATION**, Neville Island, Pittsburgh, Penna.
- **THE J. B. EHRMAN & SONS MFG. CO.**, Enterprise, Kans.
- **ERIE STEEL CONST. CO.**, Giest Road & N. P. R. R., Erie, Pa.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **FULLER COMPANY**, Fuller Bldg., Cotosauqua, Pa.
- **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.
- **GIFFORD-WOOD CO.**, 1 Hudson Ave., Hudson, N. Y.
- **HARDY SCALES CO.**, 5701 So. Atlantic Blvd., Maywood, Calif.
- **THE HELTZEL STEEL FORM AND IRON CO.**, 1750 Thomas Road, Warren, Ohio
- **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
- **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **FRANK A. KREMSER & SONS, INC.**, 3435-45 N. 5th St., Philadelphia 40, Pa.
- **LANDIS STEEL CO.**, 116 W. A St., Picher, Okla.
- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

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DIRECTORY

•LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

NORTHERN CONVEYOR CO., 327 W. State St., Janesville, Wis.

NOBLE CO., 1860 Seventh St., Oakland 20, Calif.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill.

TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.

WEBSTER MFG. INC., Tiffin 15, Ohio

ELEVATORS, Portable (See Loaders, Truck)

ENGINEERING SERVICE, Consulting and Designing

ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.

ARNOLD & WEICEL DIV., TOLEDO ENGINEERING CO., INC., 558 Wall St., Toledo 6, Ohio

BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.

CHICAGO STEEL FOUNDRY CO., 3720 So. Kedzie Ave., Chicago 32, Ill.

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

H. C. McALL, CONCRETE ENG. SERVICE CO., 35 Berkley Place, Columbus 1, Ohio

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•THE DORR CO., INC., Barry Place, Stamford, Conn.

•EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

EASTON CAR & CONSTRUCTION CO., Easton, Pa.

THE H. K. FERGUSON CO., Ferguson Building, Cleveland 14, Ohio

THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

GREENVILLE MFG. WORKS, Greenville, Ohio

E. LEE HEIDENREICH, JR., 67 Second St., Newburgh, N. Y.

ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

•KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

LIME INDUSTRY MANAGEMENT & ENGINEERING, Hershey, Pa.

•LINK BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.

MACDONALD ENGINEERING CO., 188 West Randolph St., Chicago 1, Ill.

E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

McNALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.

MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.

•MINERALS DRESSING DIV., AMERICAN CYANAMID CO., 30 Rockefeller Plaza, New York 20, N. Y.

NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.

NICHOLSON CO., 10 Rockefeller Plaza, New York 20, N. Y.

NOVIRA INC., 420 Lexington Ave., New York 17, N. Y.

OVERSTROM & SONS, 2213 W. Mission Road, Alhambra, Calif.

THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

•PETTIBONE MULLIKEN CORP., 4710 Division St., Chicago 51, Ill.

POSEY IRON WORKS, INC., INDUSTRIAL HEATING DIVN., 560 S. Prince St., Lancaster, Pa.

WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.

SEPARATION PROCESS CO., Fuller Bldg., Catsaouqua, Pa.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

VIBRATION ENGINEERING CO., 131 Wyoming St., Hazleton, Pa.

HUGO W. WEIMER CO., 2412 W. State St., Milwaukee 3, Wis.

THE WELLMAN ENGINEERING CO., 7030 Central Ave., Cleveland 5, Ohio

•WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

•WILLIAMS PATENT CRUSHER & PULV. CO., INC., 2701 N. Broadway, St. Louis 8, Mo.

•WITTMANN MACHINERY CO., Paynters Road, Farmingdale, N. J.

•YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

ENGINES, Diesel (see Diesel Engines)

ENGINES

1. Gasoline
2. Kerosene
3. Marine
4. Natural Gas or L. P. G.

•ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

1-2-3

•ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION, P. O. Box 512, Milwaukee 1, Wis.

1-2-3

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.

3

BRIGGS & STRATTON CORP., 2711 N. 13th St., Milwaukee 1, Wis.

1

THE BUDA COMPANY, 154th & Commercial, Harvey, Ill.

1-3-4

J. I. CASE CO., 700 State St., Racine, Wis.

1-2-4

•CHRYSLER INDUSTRIAL ENGINE DIV., 12,200 E. Jefferson St., Detroit 31, Mich.

1

CONTINENTAL MOTORS CORP., 20 S. Market St., Muskegon, Mich.

1-2-3-4

THE COOPER-BESSEMER CORP., Mount Vernon, Ohio

4

ENTERPRISE ENGINE & MACHINERY CO., 18th and Florida Sts., San Francisco 10, Calif.

3-4

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

1-2-3-4

GLADDEN PRODUCTS CORP., 635 W. Colorado Blvd., Glendale 4, Calif.

1-2

•HARNISCHFEGGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

3

HERCULES MOTORS CORP., 101 Eleventh St. S.E., Canton 2, Ohio

1-2-4

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

3-4

•INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.

1

•LEROI CO., 1706 So. 68th St., Milwaukee, Wis.

1-4

LORIMER ENGINE DIV. ATLAS IMPERIAL DIESEL ENGINE CO., 1000 19th Ave., Oakland 6, Calif.

3-4

•MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.

1-3

MINNEAPOLIS-MOLINE CO., P. O. Box 1050, Minneapolis 1, Minn.

1-2-4

MURPHY DIESEL CO., 5317 W. Burnham St., Milwaukee 14, Wis.

3

•NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.

1-3-4

NOVO ENGINE CO., 702 Porter St., Lansing 5, Mich.

1-2

D. W. ONAN & SONS INC., University Ave., S.E., at 25th, Minneapolis 14, Minn.

1-2-4

SHEPPARD DIESELS, Philadelphia St., Hanover, Pa.

3

WAUKESHA MOTOR CO., Box 379, Waukesha, Wis.

1-2-3

WILLIS-OVERLAND MOTORS, INC., Wolcott Blvd., Toledo 1, Ohio

1

WISCONSIN MOTOR CORP., 1910 So. 53rd St., Milwaukee 46, Wis.

1-2-4

WITTE ENGINE WORKS, DIV. OF OIL WELL SUPPLY CO., 1600 Oakland Ave., Kansas City 3, Mo.

1-2-3-4

•WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

1-2

3-4

ENTRAINED AIR INDICATORS

AUTOLANTE LUBRICANTS CO., PROTEX DIVN., 1331 W. Evans Ave., Denver 9, Colo.

CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

EXCAVATORS, Cable-way Dragline (see Cable Excavators)

EXCAVATORS, Clamshell (see Cranes)

EXCAVATORS, Scraper (see Cable Excavators)

EXCAVATORS, Tower (see Cableways)

EXHAUSTERS

C. L. AMMERMAN CO., 3719 Third St. N.E., Minneapolis 21, Minn.

DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

THE NORTHERN BLOWER CO., 6408 Barborton Ave., Cleveland 2, Ohio

PANGBORN CORP., Hagerstown, Md.

•WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

EXPLOSIVES & DYNAMITE

•AMERICAN CYANAMID CO., Explosives Dept., 30 Rockefeller Plaza, New York 20, N. Y.

ATLAS POWDER CO., Delaware Trust Bldg., Wilmington, Del.

•E. I. du PONT de NEMOURS & CO., INC., Wilmington, Del.

THE ENSIGN-BICKFORD CO., S. Hopedew St., Simsbury, Conn.

THE EQUITABLE POWDER MFG. CO., East Alton, Ill.

•HERCULES POWDER CO., 946 King St., Wilmington, Del.

ILLINOIS POWDER MFG. CO., 730 Pierce Bldg., St. Louis 2, Mo.

THE KING POWDER CO., INC., 1703-11st National Bank Bldg., Cincinnati 2, Ohio

MILLER MANUFACTURING CO., Mills Bldg., P. O. Dr. 666, El Paso, Tex.

NATIONAL POWDER CO., Elwood, Pa.

•TROJAN POWDER CO., 17 N. Seventh St., Allentown, Pa.

VIBRATION ENGINEERING CO., 131 N. Wyoming St., Hazleton, Pa.

F

FANS AND BLOWERS

•ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.

C. L. AMMERMAN CO., 3719 Third St., N.E., Minneapolis 21, Minn.

BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.

BUFFALO FORGE CO., 490 Broadway, Buffalo 5, N. Y.

CLARAGE FAN CO., 619 Porter St., Kalamazoo 16, Mich.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

COPPUS ENGINEERING CORP., 344 Park Ave., Worcester 2, Mass.

DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

THE DEVLBISS CO., 300 Phillips Ave., Toledo 1, Ohio

HOMELITE CORP., Riverside Ave., Port Chester, N. Y.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.

JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

•KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

•KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

•MAHR MFG. CO., DIV. DIAMOND IRON WKS., 1728 2nd St., No., Minneapolis 11, Minn.

•THE NORTHERN BLOWER CO., 6408 Barberton Ave., Cleveland 2, Ohio

•PANGBORN CORP., Hagerstown, Md.

•SINTERING MACHINERY CORP., Netcong, N. J.

•THE SPENCER TURBINE CO., 486 New Park Ave., Hartford 6, Conn.

FASTENERS, Belt (see Belt Fasteners)

FEEDERS, Concrete

•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

•THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio

•LINK BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•MERRICK SCALE MFG. CO., 180 Autumn St., Passaic, N. J.

•LESLIE C. MILLER SUPPLY INC., P. O. Box 7, Bedford, Ohio

•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

•WITTEMANN MACHINERY CO., Paynters Road, Farmingdale, N. J.

FEEDERS, Flue Dust

•BEAUMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.

•BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.

•THE BONNOT CO., 722 Mulberry S.E., Canton 2, Ohio

•FULLER COMPANY, Fuller Bldg., Catsaqua, Pa.

•MERRICK SCALE MFG. CO., 180 Autumn St., Passaic, N. J.

•F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

FEEDERS

1. Apron
2. Proportioning
3. Reciprocating
4. Screw
5. Table
6. Weight Proportioning
7. Rotary
8. Chain
9. Scale Conveyor

•ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

•AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

•ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC., 958 Wall St., Toledo 6, Ohio

•AUSTIN-WESTERN CO., Aurora, Ill.

•BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.

•THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

•BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

•BOHDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio

•THE BONNOT CO., 722 Mulberry S.E., Canton 2, Ohio

•THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.

•L. BURMEISTER CO., 4535 W. Mitchell St., Milwaukee 14, Wis.

•BUTLER BIN CO., Box 407, Waukesha, Wis.

•CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.

•CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

•THE DEISTER CONCENTRATOR CO., P. O. Box 1, Fort Wayne 1, Ind.

•DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

•DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.

•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

•FULLER COMPANY, Fuller Bldg., Catsaqua, Pa.

•THE GALCHER COMPANY, 545 W. 8th South, Salt Lake City, Utah

•GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.

•GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.

•GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.

•HAMMERMILLS, INC., DIV. OF PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.

•HARDINGE CO., INC., 240 Arch St., York, Pa.

•THE MELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio

•ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

•ROBERT HOLMES & BROS. INC., 3519 Junction Ave., Danville, Ill.

•THE HOWE SCALE CO., Rutland, Vt.

•IOWA MFG. CO., 916 16th St. N.E., Cedar Rapids, Iowa

•THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

•THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.

•KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

•KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.

•THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio

•KORB-PETTIT WIRE FABRICS & IRON WORKS, INC., 1505-15 N. Mascher St., Philadelphia 22, Pa.

•FRANK A. KREMSE & SONS, INC., 3435-45 N. 5th St., Philadelphia 40, Pa.

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LIPPMAHN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

•MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

•MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

•E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

•MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.

•MERRICK SCALE MFG. CO., 180 Autumn St., Passaic, N. J.

•THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.

•MORSE BROS. MACHINERY CO., 2900 Brighton Blvd., Denver 1, Colo.

•MCLANAHAN AND STONE CORP., Hollidaysburg, Pa.

•McNALLY-PITTSBURG MFG. CORP., Pittsburg, Kans.

•NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.

•NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.

•NORTHERN CONVEYOR CO., 327 W. State St., Janesville, Wis.

•PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

•POSEY IRON WORKS, INC., INDUSTRIAL HEATING DIVN., 560 S. Prince St., Lancaster, Pa.

•RICHARDSON SCALE CO., Von Houten Ave., Clifton, N. J.

•ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

•ROSS SCREEN & FEEDER CO., 19 Rector St., New York 6, N. Y.

•SCHAEFFER POLDOMETER CO., 2828 Smallman St., Pittsburg 22, Pa.

•SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.

•SINTERING MACHINERY CORP., Netcong, N. J.

•F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

•SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

•SPROUT, WALDRON & CO., INC., Muncy, Pa.

•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

•STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

•SYNTRON CO., 450 Lexington Ave., Homer City, Pa.

•TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

•TOLEDO SCALE CO., 1090 Telegraph Rd., Toledo 12, Ohio

•TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

•TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill.

•UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

•UNIVERSAL ENGINEERING CORP., 625 C Ave. N. W., Cedar Rapids, Iowa

•WEBSTER MFG. INC., Tiffin 16, Ohio

•WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

•WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.

•WITTEMANN MACHINERY CO., Paynters Road, Farmingdale, N. J.

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•WITTEMANN MACHINERY CO., Paynters Road, Farmingdale, N. J.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

THE GALIGHER COMPANY, 545 W. 8th South, Salt Lake City, Utah

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg., Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

GROCH ENGINEERING CO., 1612 W. 109 Pl., Los Angeles 46, Calif.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.

MINERALS DRESSING DIV., AMERICAN CYANAMID CO., 30 Rocketteller Plaza, New York 20, N. Y.

MORSE BROS. MACHINERY CO., 2900 Brighton Blvd., Denver 1, Colo.

WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.

SEPARATION PROCESS CO., Fuller Bldg., Cotosauqua, Pa.

THE SINK AND FLOAT CORP., Empire State Bldg., New York 1, N. Y.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

STEARNS-ROGERS MFG. CO., 1720 California St., Denver 2, Colo.

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

FLOTATION REAGENTS & SUPPLIES

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.

ARMOUR & COMPANY, 1355 W. 31st St., Chicago 9, Ill.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

THE DOW CHEMICAL CO., Midland, Mich.

GROCH ENGINEERING CO., 1612 W. 109 Pl., Los Angeles 46, Calif.

HERCULES POWDER CO., 946 King St., Wilmington, Del.

KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.

MINERALS DRESSING DIV., AMERICAN CYANAMID CO., 30 Rocketteller Plaza, New York 20, N. Y.

NEWPORT INDUSTRIES, INC., 230 Park Ave., New York 17, N. Y.

NOPOCO CHEMICAL CO., First and Essex Sts., Harrison, N. J.

ORONITE CHEMICAL CO., 38 Sansome St., San Francisco 4, Calif.

PHILADELPHIA QUARTZ CO., Public Ledger Bldg., 6th & Chestnut Sts., Philadelphia 6, Pa.

QUIGLEY COMPANY, INC., 527 Fifth Ave., New York 17, N. Y.

SEPARATION PROCESS CO., Fuller Bldg., Cotosauqua, Pa.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

FROGS AND SWITCHES, Railway

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

THE FROG, SWITCH & MFG. CO., Carlisle, Pa.

MIDWEST STEEL CORP., Charleston 2, W. Va.

PETITBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

UNITED STATES STEEL CO., Pittsburgh 30, Pa.

FURNACES, Forging

THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.

GARDNER-DENVER CO., Quincy, Ill.

JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.

MAHR MFG. CO., DIV. DIAMOND IRON WORKS, 1728 2nd St. No., Minneapolis 11, Minn.

NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.

FUSES, Detonating & Blasting (see Blasting Supplies)

G

GAS ANALYZERS AND RECORDERS

BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio

E. D. BULLARD CO., 275 Eighth St., San Francisco 3, Calif.

BURRELL CORP., 1942 Fifth Ave., Pittsburgh 19, Pa.

CAMBRIDGE INSTRUMENT CO., INC., 3765 Grand Central Terminal, New York 17, N. Y.

CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.

ELLISON DRAFT GAGE CO., 214 W. Kinzie St., Chicago 10, Ill.

CHARLES ENGELHARD, INC., 850 Passaic Ave., East Newark, N. J.

THE HAYS CORP., East 8th St., Michigan City, Ind.

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.

MINNEAPOLIS - HONEYWELL REGULATOR CO., Brown Instruments Div., Wayne and Roberts Aves., Philadelphia 44, Pa.

THE PERKIN-ELMER CORP., 535 Hope St., Glenbrook, Conn.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

GAS BURNERS, Natural

THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.

NATIONAL AIROIL BURNER CO., 1298 E. Sedgley Ave., Philadelphia 34, Pa.

RAY OIL BURNER CO., 401 Bernal Ave., San Francisco 12, Calif.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

STAPLES & PFEIFFER, 528 Brant St., San Francisco 7, Calif.

GAS PRODUCERS

KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.

THE WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 5, Ohio

R. D. WOOD CO., 1072 Public Ledger Bldg., Philadelphia 5, Pa.

GATES (see Bin Gates and Chutes)

GEAR-MOTORS

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wis.

FOOTE BROS. GEAR & MACHINE CORP., 4545 S. Western Blvd., Chicago 9, Ill.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

STERLING ELECTRIC MOTORS, INC., 5401 Anaheim-Telegraph Road, Los Angeles 22, Calif.

U. S. ELECTRICAL MOTORS INC., 200 E. Slauson Ave., Los Angeles 54, Calif.

WAGNER ELECTRIC CORP., 6400 Plymouth Ave., St. Louis 14, Mo.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

GEAR REDUCERS (see Drives)

GEARS

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BERGEN MACHINE & TOOL CO., INC., 189 Franklin St., Nutley 10, N. J.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

THE CLEVELAND WORM & GEAR CO., 3249 E. Eightieth St., Cleveland 4, Ohio

THE COMMERCIAL SHEARING & STAMPING CO., P. O. Box 719, Youngstown 1, Ohio

CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

DIAMOND IRON WORKS, INC., 1728 2nd St., No. Minneapolis 11, Minn.

DODGE MFG. CORP., Mishawaka, Ind.

THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wis.

FARRELL - BIRMINGHAM CO., INC., Ansonia, Conn.

FOOTE BROS. GEAR & MACHINE CO., 4545 S. Western Blvd., Chicago 9, Ill.

THE FROG, SWITCH & MFG. CO., Carlisle, Pa.

GRAHAM TRANSMISSIONS, INC., 3754 N. Halton St., Milwaukee 12, Wis.

D. O. JAMES MFG. CO., 1114 W. Monroe St., Chicago 7, Ill.

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

MCCALL-PITTSBURG MFG. CORP., Pittsburg, Kans.

PHILADELPHIA GEAR WORKS, Erie Ave. & G St., Philadelphia, Pa.

RYOTT FOUNDRY & MACHINE CO., 328 No. Sangamon St., Chicago 7, Ill.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

STEARNS-ROGERS MFG. CO., 1720 California St., Denver 2, Colo.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STROM PROCESS STEEL CO., 1428 High St., Pittsburgh 12, Pa.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

YULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.

WEBSTER MFG. INC., Tiffin 16, Ohio

YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

GENERATOR SETS, Electric

1. Diesel Engine
2. Gasoline Engine
3. Electric Motor
4. Turbine

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.

THE BUDA COMPANY, 154th & Commercial, Harvey, Ill.

CATERPILLAR TRACTOR CO., Peoria 8, Ill.

CHICAGO PNEUMATIC TOOL CO., G. E. 44th St., New York 17, N. Y.

CONSOLIDATED DIESEL ELEC. CORP., Ludlow and Canal Sts., Stamford, Conn.

CROCKER-WHEELER ELECTRIC MFG. CO., DIV. OF ELLIOTT CO., Amper, N. J.

CUMMINS ENGINE CO., INC., Fifth & Union Sts., Columbus, Ind.

DAVEY COMPRESSOR CO., N. Water & Saginaw Sts., Kent, Ohio

DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

DETROIT DIESEL ENGINE DIV., GENERAL MOTORS CORP., 13400 W. Outer Dr., Detroit 28, Mich.

DUPLEX TRUCK CO., 830 E. Hazel St., Lansing 5, Mich.

ELECTRIC MACHINERY MFG. CO., 1331 Tyler St., N. E., Minneapolis 14, Minn.

FAIRBANKS MORSE & CO., 600 E. Michigan Ave., Chicago 5, Ill.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

HOBART BROTHERS CO., Hobart Square, Troy, Ohio

HOMELITE CORP., Riverdale Ave., Port Chester, N. Y.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

INTERNATIONAL DIESEL ELECTRIC CO., INC., 13-02 44th Ave., Long Island City 1, N. Y.

KATO ENGINEERING CO., 108 Maxfield St., Mankato, Minn.

LEROI CO., 1705 So. 68th St., Milwaukee, Wis.

R. G. LeTOURNEAU, INC., 2301 N. Adams St., Peoria, Ill.

LISTER BLACKSTONE INC., 420 Lexington Ave., New York 17, N. Y.

MURPHY DIESEL CO., 5317 W. Burnham St., Milwaukee 14, Wis.

NORDBERG MFG. CO., 3073 S. Chase Ave., Milwaukee 7, Wis.

D. W. ONAN & SONS INC., University Ave., S.E. at 25th, Minneapolis 14, Minn.

RELIANCE ELECTRIC & ENGINEERING CO., 1088 Ivanhoe Rd., Cleveland 10, Ohio

SHEPPARD DIESELS, Philadelphia St., Hanover, Pa.

STERLING MACHINERY CORP., 411 Southwest Blvd., Kansas City 8, Mo.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

LAWRENCE WILSON, 215 Main St., Buffalo, N. Y.

WITTE ENGINE WORKS, DIV. OF OIL WELL SUPPLY CO., 1600 Oakland Ave., Kansas City 3, Mo.

WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

GRAPPLES (see Buckets)

GREASE (see Lubricants)

GRINDERS, for Detachable Bits (see Bits, Grinders)

GRINDING AIDS, Cement

AUTOLENE LUBRICANTS CO., PROTEX DIV., 1331 W. Evans Ave., Denver 9, Colo.

DEWEY AND ALMY CHEMICAL CO., 62 Whittemore Ave., Cambridge 40, Mass.

HARDING CO., INC., 240 Arch St., York, Pa.

GRINDING MEDIA, Mills

ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

THE CALIFORNIA WIRE CLOTH CORP., 1080 19th Ave., Oakland 5, Calif.

THE COLORADO FUEL & IRON CORP., P. O. Box 1920, Denver 1, Colo.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

HARDING CO., INC., 240 Arch St., York, Pa.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.

THE PATTERSON FOUNDRY & MACHINE CO., 1750 St. George St., East Liverpool, Ohio

FULVEIZING MACHINERY CO., Chatham Road, Summit, N. J.

RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO. INC., 1315 N. Branch St., Chicago 22, Ill.

SHEFFIELD STEEL CORP., Sheffield St., Kansas City 3, Mo.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

UNITED STATES STEEL CO., Pittsburgh 30, Pa.

GRINDING MILL CONTROLS, Feed Regulators

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

HARDING CO., INC., 240 Arch St., York, Pa.

THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.

PETTYBONE MULLIKEN CORP., 4710 Division St., Chicago 51, Ill.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

GRINDING PEBBLES (see Grinding Media)

GRIZZLIES (see Screens)

GUARDS, Machinery

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

HARRINGTON & KING PERFORATING CO., 5655 Fillmore St., Chicago 44, Ill.

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

THE STANDARD METAL MFG. CO., Malinta, Ohio

THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio

GUNS & CARTRIDGES, Kiln Ring Removal

E. I. DUPONT DE NEMOURS & CO., INC., EXPLOSIVES DEPT., Wilmington 98, Del.

REMINGTON ARMS CO., INC., 939 Barnum Ave., Bridgeport 2, Conn.

WINCHESTER REPEATING ARMS CO., 275 Winchester Ave., New Haven, Conn.

GUNS, Hydraulic Monitor (see Monitors, Hydraulic)

GYPSUM PLANT MACHINERY

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

THE HER-BORN ENGR. & MFG. CO., P. O. Box 666, Sandusky, Ohio

IOWA MFG. CO., 916 16th St., N.E., Cedar Rapids, Iowa

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

McLANAHAN AND STONE CORP., Hollidaysburg, Pa.

NOVERA INC., 420 Lexington Ave., New York 17, N. Y.

PENNSYLVANIA CRUSHER CO., Liberty Trust Bldg., Philadelphia 7, Pa.

PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO. INC., 1315 N. Branch St., Chicago 22, Ill.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N. Y.

GYPSUM PLANTS, Engineers, Contractors

THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

E. LEE HEINERICH, JR., 67 Second St., Newburgh, N. Y.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

NOVERA INC., 420 Lexington Ave., New York 17, N. Y.

WM. E. ROBINSON & CO., 3307 Spring Garden St., Philadelphia 4, Pa.

STEARNS-ROGERS MFG. CO., 1720 California St., Denver 2, Colo.

H HAMMERMILLS (see Crushers, Hammer)

HARDENERS, Concrete

A. C. HORN CO., INC., 10th St. and 44th Ave., Long Island City 1, N. Y.

THE MASTER BUILDERS CO., 7016 Euclid Ave., Cleveland 3, Ohio

PHILADELPHIA QUARTZ CO., Public Ledger Bldg., 6th and Chestnut Sts., Philadelphia 6, Pa.

REARSON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N. J.

SPRAY-O-BOND COMPANY., 2225 N. Humboldt Ave., Milwaukee 12, Wis.

TAMMS INDUSTRIES, INC., 228 No. LaSalle St., Chicago 1, Ill.

HARD SURFACING METALS (see Welding Rods, Hard Facing)

HEAT EXCHANGERS

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.

THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

STAPLES & PEIFFER, 528 Bryant St., San Francisco 7, Calif.

STRUTHERS WELLS CORP., Pennsylvania Ave., Warren, Pa.

WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

HEAT TREATING MACHINES, Drill Steel

THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

MAHR MFG. CO. DIV. DIAMOND IRON WKS., 1728 22nd St., No., Minneapolis 11, Minn.

HEATERS, Concrete Mixer

AEROL PRODUCTS CO., 5701 Park Ave., West New York, N. J.

HAUCK MFG. CO., 124-136 Tenth St., Brooklyn 15, N. Y.

LITTLEFOOT BROS. INC., 460 East Pearl St., Cincinnati, Ohio

HEATERS, ELECTRIC, Bitumen

EASTON CAR & CONSTRUCTION CO., Easton, Pa.

HEATERS, Plant, Hot Air

CLARAGE FAN CO., 619 Porter St., Kalamazoo 16, Mich.

COMBUSTION EQUIPMENT DIV., TODD SHIPYARDS CORP., 81-16 45th Ave., Elmhurst, Queens, N. Y.

HOISTS

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 6, Ind.

ATLAS CORP., Mountville, Pa.

BEAUMONT BIRCH CO., 1503 Race St., Philadelphia 2, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

C. H. & E. MFG. CO., 3849 N. Palmer St., Milwaukee 12, Wis.

CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.

CHISHOLM-MOORE HOIST CORP., Fremont Ave., Tonawanda, N. Y.

THE CLEVELAND CHAIN & MFG. CO., 445 Henry St., Cleveland 5, Ohio

THE CLEVELAND CRANE & ENGINEERING CO., 5866 E. 289th St., Wickliffe, Ohio

CLIFFER MFG. CO., 2807 Warwick, Kansas City 8, Mo.

CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.
COFFING HOIST CO., 800 Walter St., Danville, Ill.
CONSTRUCTION MACHINERY CO'S., Glenwood & Vinton Sts., Waterloo, Iowa
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
CURTIS PNEUMATIC MACHINERY CO., 1988 Kienlen Ave., St. Louis 20, Mo.
DEMPSTER BROTHERS, INC., Springdale St., Knoxville 17, Tenn.
DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
DODSON MFG. CO., INC., 1463 Barwise, Wichita 2, Kans.
DRAVO CORP., ENGINEERING WKS. DIV., Neville Island, Pittsburgh 6, Pa.
THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
ELECTRO LIFT INC., 30 Church St., New York 7, N.Y.
FORD CHAIN BLOCK DIV. AMERICAN CHAIN & CABLE CO., INC., Reading, Pa.
GALENA MACHINE & ELECTRIC CO., 209-11 Main St., Galena, Kans.
GAR WOOD INDUSTRIES, INC., Wayne Div., Wayne, Mich.
GARDNER-DENVER CO., Quincy, Ill.
F. C. GEORGE MACHINE CO., INC., 100 S. Westmoreland Dr., Orlando, Fla.
GREENVILLE MFG. WORKS, Greenville, Ohio
HARNISCHFEGGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.
THE HEIL CO., 3000 W. Montana St., Milwaukee 1, Wis.
ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N.J.
ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
HYDRO-FORGED STONE ASSOCIATES, INC., 420 Bulkley Bldg., Cleveland 15, Ohio
INDEPENDENT PNEUMATIC TOOL CO., 175 State St., Aurora, Ill.
INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.
ISAACSON IRON WKS., Box 3028, Seattle, Wash.
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio
LEWIS-SHEPARD PRODUCTS INC., 206 Walnut St., Watertown 72, Mass.
MISHCO CORP., 615 SW 2nd Ave., Miami, Fla.
McKERNAN-TERRY CORP., 505 Minor Ave., Harrison, N.J.
McLANAHAN AND STONE CORP., Hollidaysburg, Pa.
NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.
NOVO ENGINE CO., 702 Porter St., Lansing 5, Mich.
O. K. CLUTCH & MACHINERY CO., Florence St., Columbia, Pa.
ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.
ST. PAUL HYDRAULIC HOIST CO., 2207 University Ave. S. E., Minneapolis, Minn.
SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill.
SHEPARD MILES CRANE & HOIST CORP., Schuyler Ave., Montour Falls, N.Y.

SILENT HOIST & CRANE CO., 841 63rd St., Brooklyn 20, N.Y.
STEARNS-ROGERS MFG. CO., 1720 California St., Denver 2, Colo.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
STERLING MACHINERY CORP., 411 Southwest Blvd., Kansas City 8, Mo.
SUPERIOR - LIDGERWOOD - MUNDY CORP., 7 Day St., New York 7, N.Y.
TRUCK EQUIPMENT CO., INC., 1791 Fillmore Ave., Buffalo 14, N.Y.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
VULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.
THE WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 5, Ohio
WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
WOOLDRIDGE MANUFACTURING CO., Sunnyside, Calif.
WRIGHT HOIST DIV. AMERICAN CHAIN & CABLE CO., New York, Pa.
THE YALE & TOWNE MFG. CO., Philadelphia 15, Pa.

HOPPERS, Aggregates, Cement, etc.

ANDERSON ENGINEERING CO., 237 Bent St., Cambridge 41, Mass.
AUSTIN-WESTERN CO., Aurora, Ill.
BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.
THE C. O. BARTLETT AND SHOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
BETHLEHEM STEEL CO., 7 E. 3rd St., Bethlehem, Penna.
BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh 22, Pa.
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
L. BURMEISTER CO., 4539 W. Mitchell St., Milwaukee 14, Wis.
BUTLER BIN CO., Box 407, Waukesha, Wis.
CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N.Y.
CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
CONSTRUCTION MACHINERY COS., Glenwood & Vinton Sts., Waterloo, Iowa
CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 11, Minn.
DRAVO CORP., ENGINEERING WKS. DIV., Neville Island, Pittsburgh 6, Pa.
THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
ELWELL-PARKER ELECTRIC CO., 4205 St. Clair Ave., Cleveland 14, Ohio
ERIE STEEL CONST. CO., Giest Road & N. P. R. R., Erie, Pa.
FLEMING MFG. CO., 4985 Fyler Ave., St. Louis, Mo.
GAR-BRO. MFG. CO., 2416 E. 16th St., Los Angeles 21, Calif.
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
GENERAL ENGINES CO., INC., 307 Hunter St., Gloucester, N.J.
GREENVILLE MFG. WORKS, Greenville, Ohio

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.
THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
ROBINS CONVEYORS DIV. HEWITT - ROBINS, INC., 270 Passaic Ave., Passaic, N.J.
HYDRO-FORGED STONE ASSOCIATES, INC., 420 Bulkley Bldg., Cleveland 15, Ohio
IOWA MFG. CO., 916 16th St. N. E., Cedar Rapids, Iowa
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.
THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio
KLIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.
E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
NOBLE CO., 1860 Seventh St., Oakland 20, Calif.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N.J.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
WEBSTER MFG. INC., Tiffin 16, Ohio
WITTEMANN MACHINERY CO., Paynters Rd., Farmingdale, N.J.

HOPPERS, Unloading Ready Mixed Concrete

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
BUTLER BIN CO., Box 407, Waukesha, Wis.
CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo.
GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.
THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
THE JAEGER MACHINE CO., 550 W. Spring St., Columbus 16, Ohio
THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
KLIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

HOSE, Rubber

1. Hydraulic
 2. Pneumatic
 3. Oil
 4. Sand
AERO-COUPLING CORP., 1053 N. Hollywood Way, Burbank, Calif.
AEROGUIP CORP., 300 S. East Ave., Jackson, Mich.
AMERICAN VENTILATING HOSE CO., 15 Park Row, New York 7, N.Y.
BOSTON WOVEN RUBBER & RUBBER CO., P. O. Box 1071, Boston 3, Mass.
CARLYLE RUBBER CO., INC., 62-66 Park Pl., New York 7, N.Y.

CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N.Y.
THE CINCINNATI RUBBER MFG. CO., Franklin Ave., Cincinnati 12, Ohio
CONTINENTAL RUBBER CO., 1999 Liberty Blvd., Erie, Pa.
DAYTON RUBBER MFG. CO., 4th St. and Jefferson, Dayton, Ohio
THE DEVLISSE CO., 300 Phillips Ave., Toledo 10, Ohio
THE EIMCO CORP., P. O. Box 300 Salt Lake City 10, Utah
THE FIRESTONE TIRE & RUBBER CO., 1270 Firestone Pkwy., Akron 17, Ohio
GARDNER-DENVER CO., Quincy, Ill.
THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.
L. N. GILMER CO. DIV. OF UNITED STATES RUBBER CO., Tacoma 35, Pa.
GOODALL RUBBER CO., Whitehead Road, Trenton 4, N.J.
B. F. GOODRICH CO., Akron 11, Ohio
THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio
HAMILTON RUBBER MFG. CORP., Mead St., Trenton 3, N.J.
HEWITT RUBBER DIV. HEWITT-ROBINS INC., 240 Kensington Ave., Buffalo 5, N.Y.
JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.
PANGBORN CORP., Hagerstown, Md.
QUAKER PACIFIC RUBBER CO., 598 Potero Ave., San Francisco 10, Calif.
QUAKER RUBBER CORP., Tacony & Comly Sts., Philadelphia 24, Pa.
RAYBESTOS - MAHATTAN, INC., N. J.
REPUBLIC RUBBER DIV. LEE RUBBER & TIRE CORP., Albert St., Youngstown 1, Ohio
RODGERS HYDRAULIC INC., 7401 Walker St., Minneapolis 16, Minn.
SCHRAMM INC., West Chester, Pa.
STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.
THERMOID COMPANY, Trenton, N.J.
UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N.Y.
WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N.J.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

HOSE FITTINGS

- AERO-COUPLING CORP.**, 1053 N. Hollywood Way, Burbank, Calif.
- AEROQUIP CORP.**, 300 S. East Ave., Jackson, Mich.
- BOSTON WOVEN HOSE & RUBBER CO.**, P. O. Box 1071, Boston 3, Mass.
- THE BRADY CONVEYORS CORP.**, 20 W. Jackson Blvd., Chicago 4, Ill.
- CARLYLE RUBBER CO., INC.**, 62-66 Park Pl., New York 7, N. Y.
- CHICAGO PNEUMATIC TOOL CO.**, 6 E. 44th St., New York 17, N. Y.
- THE CINCINNATI RUBBER MFG. CO.**, Franklin Ave., Cincinnati 12, Ohio
- CONTINENTAL RUBBER CO.**, 1999 Liberty Blvd., Erie, Pa.
- THE DEVLISS CO.**, 300 Phillips Ave., Toledo 1, Ohio
- DIXON VALVE & COUPLING CO.**, Hancock & Columbia Ave., Philadelphia 2, Pa.
- GARDNER-DENVER CO.**, Quincy, Ill.
- THE GATES RUBBER CO.**, 999 S. Broadway, Denver 17, Colo.
- GOODALL RUBBER CO.**, Whitehead Road, Trenton 4, N. J.
- THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
- HAMILTON RUBBER MFG. CORP.**, Mead St., Trenton 3, N. J.
- HARDGOG PNEUMATIC TOOL CO.**, 225 So. Benton St., Ottumwa, Iowa
- HEWITT RUBBER DIV., HEWITT-ROBINS INC.**, 240 Kensington Ave., Buffalo 5, N. Y.
- INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.
- INGERSOLL-RAND CO.**, 11 Broadway, New York 4, N. Y.
- JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
- KNOX MFG. CO.**, 226 W. Clinton Ave., Oaklyn, N. J.
- LINCOLN ENGINEERING CO.**, 5701 Natural Bridge, St. Louis 20, Mo.
- MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.
- NEW HAVEN VIBRATOR CO.**, 145 Chestnut St., New Haven 7, Conn.
- RAYBESTOS - MANHATTAN, INC.**, 61 Willett St., Passaic, N. J.
- THERMOID COMPANY**, Trenton, N. J.
- UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N. Y.
- WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.
- WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

HULLS, Dredge (see Dredges)

HUMIDIFIERS, Laboratory (see Laboratory Apparatus)

HYDRAULIC CYLINDERS

- THE COMMERCIAL SHEARING & STAMPING CO.**, P.O. Box 719, Youngstown 1, Ohio
- LAPLANT-CHOATE MFG. CO., INC.**, 2920 1st Ave. N.E., Cedar Rapids, Iowa

- M-KIERMAN-TERRY CORP.**, 505 Manor Ave., Harrison, N. J.
- RODGERS HYDRAULIC, INC.**, 7401 Walker St., Minneapolis 16, Minn.
- SHEPPARD DIESELS**, Philadelphia St., Hanover, Pa.
- VICKERS, INC., DIV. SPERRY CORP.**, 1400 Oakman Blvd., Detroit 32, Mich.
- R. D. WOOD CO.**, 1072 Public Ledger Bldg., Philadelphia 5, Pa.

HYDRATORS, Lime

- ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC.**, 958 Wall St., Toledo 6, Ohio
- THE DORR CO., INC.**, Barry Place, Stamford, Conn.
- HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.
- THE KRITZER COMPANY, INC.**, 2901 Lawrence Ave., Chicago 25, Ill.
- OMEGA MACHINE CO.**, P. O. Box 1342, Providence 1, R. I.
- NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 7, Wis.
- TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

HYDROSEPARATORS (see Sand Recovery Machinery)

IDLERS, Conveyor (see Conveyor Idlers)

INDICATORS, Bin (see Bin Level Indicators)

INSULATION, Heat (see Refractories)

JACKS, HYDRAULIC

- THE BUDA COMPANY**, 154th & Commercial, Harvey, Ill.
- GAR WOOD INDUSTRIES, INC.**, WAYNE DIV., Wayne, Mich.
- KOENRING CO.**, 3026 W. Concordia Ave., Milwaukee 16, Wis.
- LAPLANT-CHOATE MFG. CO., INC.**, 2920 1st Ave. N.E., Cedar Rapids, Iowa
- H. K. PORTER, INC.**, 74 Foley, Somerville 43, Mass.
- RODGERS HYDRAULIC, INC.**, 7401 Walker St., Minneapolis 16, Minn.

JIGS, Sand and Gravel

- THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.
- DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
- MCLANAHAN AND STONE CORP.**, Hollidaysburg, Pa.
- OVERSTROM & SONS**, 2213 W. Mission Road, Alhambra, Calif.
- ROGERS IRON WORKS CO.**, Joplin, Mo.
- YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

K

KETTLES, Gypsum, Calcining

- BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
- GRAVER TANK & MFG. CO., INC.**, 4809 Tod Ave., East Chicago, Ind.
- NOVERA INC.**, 420 Lexington Ave., New York 17, N. Y.

KILN PARTS, ENDS, ETC.

- ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
- THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N. Y.
- BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- ELECTRIC STEEL FOUNDRY CO.**, 2141 N. W. 25th Ave., Portland 10, Ore.
- ELECTRO-ALLOYS DIV., AMERICAN BRAKE SHOE CO.**, Taylor St. & Abbey Road, Elyria, Ohio
- KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.
- F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.
- TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- UNITED IRON WORKS CO.**, 108 N. Locust, Pittsburg, Kans.
- VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

KILNS, Curing, Concrete

- BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- CAMPION FUEL ENG. DIV.**, P. O. Box 3941P, Detroit 27, Mich.
- THE CARTER-WATERS CORP.**, 2440 Pennway, Kansas City 8, Mo.
- HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- A. C. HORN CO., INC.**, 10th St. & 44th Ave., Long Island City 1, N. Y.
- JACKSON & CHURCH CO.**, 321 N. Hamilton St., Saginaw, Mich.
- MULTIPLEX MACHINERY CORP.**, Elmora, Ohio
- VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

KILNS, Lime, Vertical

- ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC.**, 958 Wall St., Toledo 6, Ohio
- BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- THE ELLERMAN CO.**, 203 Continental Bank Bldg., Salt Lake City 1, Utah
- HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- NICHOLS ENGINEERING & RESEARCH CORP.**, 70 Pine St., New York 5, N. Y.
- STRUTHERS WELLS CORP.**, Pennsylvania Ave., Warren, Pa.
- TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

KILNS, Rotary, Cement, Gypsum, Lime

- ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

- BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- THE BONNOT CO.**, 722 Mulberry S.E., Canton 2, Ohio
- HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- W. P. HEINEKEN CO.**, 227 Fulton St., New York 7, N. Y.
- KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.
- MCDERMOTT BROS. CO.**, Ft. of Washington St., Allentown, Pa.
- NICHOLS ENGINEERING & RESEARCH CORP.**, 70 Pine St., New York 5, N. Y.
- NORDBERG MFG. CO.**, 3073 So. Chase Ave., Milwaukee 7, Wis.
- NOVERA INC.**, 420 Lexington Ave., New York 17, N. Y.
- POSEY IRON WORKS, INC.**, INDUSTRIAL HEATING DIVN., 560 S. Prince St., Lancaster, Pa.
- F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.
- STRUTHERS WELLS CORP.**, Pennsylvania Ave., Warren, Pa.
- TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- UNITED IRON WORKS CO.**, 108 N. Locust, Pittsburg, Kans.
- VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

LABORATORY APPARATUS

- ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- AMERICAN INSTRUMENT CO., INC.**, Silver Spring, Md.
- THE BALDWIN LOCOMOTIVE WORKS**, Philadelphia 42, Pa.
- BURRELL CORP.**, 1942 Fifth Ave., Pittsburgh 19, Pa.
- CAMBRIDGE INSTRUMENT CO.**, 3765 Grand Central Terminal, New York 17, N. Y.
- CENTRAL SCIENTIFIC CO.**, 1700 Irving Park Rd., Chicago 13, Ill.
- DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
- THE DENVER FIRE CLAY CO.**, 2301 Blake St., Denver 17, Colo.
- FISHER SCIENTIFIC CO.**, 717 Forbes St., Pittsburgh 19, Pa.
- FORNEY'S INC.**, P.O. Box 310, New Castle, Pa.
- GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- GENERAL SCIENTIFIC EQUIPMENT CO.**, 27th & Huntingdon Sts., Philadelphia 32, Pa.
- THE GILSON SCREEN CO.**, 119 E. Market St., Mercer, Pa.
- HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- HUMBOLDT MFG. CO.**, 2014 N. Whipple St., Chicago 47, Ill.
- LEEDS & NORTHRUP CO.**, 4970 Stenton Ave., Philadelphia 44, Pa.
- MAGNETIC ENGINEERING & MFG. CO.**, 851 Van Houten Ave., Clifton, N. J.
- THE MINE & SMELTER SUPPLY CO.**, 1422 17th St., Denver 17, Colo.
- RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO., INC.**, 1315 N. Branch St., Chicago 22, Ill.
- F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.
- STURTEVANT MILL CO.**, 102 Clayton St., Boston 22, Mass.
- THE W. J. TYLER CO.**, 3615 Superior Ave., Cleveland 14, O.
- CHARLES R. WATTS & CO.**, 4121 Sixth Ave., N.W., Seattle 7, Wash.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.
 • **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.
 • **THE YODER CO.**, 5552 Walworth Ave., Cleveland, Ohio

LABORATORIES, Testing

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
 • **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
 • **THE GALIGHER COMPANY**, 545 W. 8th South, Salt Lake City, Utah
 • **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
 • **THE GILSON SCREEN CO.**, 119 E. Market St., Mercer, Pa.
 • **THE MINE & SMELTER SUPPLY CO.**, 1422 17th St., Denver 17, Colo.
 • **SEPARATION PROCESS CO.**, Fuller Bldg., Cotosouqua, Pa.
 • **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.
 • **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

LACING, Belt (see Belt Fasteners & Lacing)

LADDERS, Dredge

• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
 • **AMERICAN STEEL DREDGE CO., INC.**, 2511 Taylor St., Fort Wayne 6, Ind.
 • **BAER STEEL PRODUCTS, INC.**, P.O. Box 497, Auburn, Wash.
 • **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
 • **ELLCOTT MACHINE CORP.**, 1611 Bush St., Baltimore 30, Md.
 • **GREENVILLE MFG. WORKS**, Greenville, Ohio
 • **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

LARRIES, WEIGH (see Weigh Larries)

LAUNDERS (see Chutes)

LIFT TRUCKS, Concrete Products, etc.

1. Gas
 2. Electric
 3. Gas-Electric
 • **THE ATLAS CAR & MFG. CO.**, 1100 Ivanhoe Rd., Cleveland 10, Ohio
 1—2
 • **BAKER INDUSTRIAL TRUCK DIV., THE BAKER-BAULANG CO.**, 1250 W. 80th St., Cleveland 2, Ohio
 2—3
 • **BARRET-CRAVENS CO.**, 4629 S. Western Ave., Chicago 9, Ill.
 • **BESSER MFG. CO.**, Alpena, Mich.
 1—2—3
 • **THE BUDA COMPANY**, 154th & Commercial, Harvey, Ill.
 1
 • **CLARK EQUIPMENT CO., INDUSTRIAL TRUCK DIV.**, Springfield Pl., Battle Creek, Mich.
 • **CHASE CONCRETE MACHINERY CO.**, 15 Linwood Ave., Buffalo 2, N. Y.
 1
 • **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
 1

• **ROY DARDEN INDUSTRIES, INC.**, P. O. Box 95, North Side Branch, Atlanta 3, Ga.

• **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

• **ERICKSON POWER LIFT TRUCKS, INC.**, 1401 N. E. Marshall, Minneapolis 13, Minn.

• **ELWELL-PARKER ELECTRIC CO.**, 4205 St. Clair Ave., Cleveland 8, Ohio
 1—2—3

• **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester, N. J.

• **HYSTER CO.**, 2902 N. E. Clackamas, Portland 8, Ore.
 1

• **THE KNI-KERBOCKER CO.**, 603 Liberty St., Jackson, Mich.

• **LEWIS-SHEPARD PRODUCTS INC.**, 206 Walnut St., Watertown 12, Mass.

• **LIFT TRUCKS, INC.**, 2425 Spring Grove Ave., Cincinnati 14, Ohio

• **LULL MFG. CO.**, 3612 E. 44th St., Minneapolis 6, Minn.
 1

• **MIXERMOBILE MANUFACTURERS**, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.

• **PRASCHAK MACHINE CO.**, Marshfield, Wis.
 1

• **REVOLVATOR CO.**, 86th St. at U. S. Rts. 1 and 9, North Bergen, N. J.
 2—3

• **THE ROSS CARRIER CO.**, 140 Miller St., Benton Harbor, Mich.

• **SERVICE CASTER & TRUCK CORP.**, 500 N. Brownwood Ave., Albion, Mich.
 1

• **SILENT HOIST & CRANE CO.**, 841 63rd St., Brooklyn 20, N. Y.

• **TOWMOTOR CO.**, 176 E. 152nd St., Cleveland 10, Ohio

• **TRANSITRUCK CO.**, 2477 N.W. 23rd Ave., Portland 10, Ore.
 1

• **WITTEMANN MACHINERY CO.**, Painters Row, Farmingdale, N. J.

• **THE YALE & TOWNE MFG. CO.**, Philadelphia 15, Pa.
 1—2—3

LIGHTERS, Fuse (see Blasting Supplies)

LIME KILNS (see Kilns)

LIME AND LIMESTONE SPREADERS

• **ANTHONY COMPANY**, Streator, Ill.
 • **BAUGHMAN MFG. CO.**, Jerseyville, Ill.
 • **EVEN SPREAD CO.**, Owensville, Ohio
 • **FLINK COMPANY**, 502 N. Vermillion St., Streator, Ill.
 • **HERCULES STEEL PRODUCTS CORP.**, Sherman St., Gallion, Ohio
 • **HIGHWAY EQUIPMENT CO., INC.**, 604 D. Ave., N.W., Cedar Rapids, Iowa

LIME MORTAR & PUTTY PLANTS

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
 • **LIME INDUSTRY MANAGEMENT & ENGINEERING**, Hershey, Pa.

LIME PLANTS

• **ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC.**, 958 Wall St., Toledo 6, Ohio
 • **DIAMOND IRON WORKS, INC.**, 1728 2nd St. No., Minneapolis 11, Minn.
 • **THE DORR CO. INC.**, Barry Pl., Stamford, Conn.
 • **THE ELLERMAN CO.**, 203 Continental Bank Bldg., Salt Lake City 1, Utah
 • **GIFFORD-WOOD CO.**, 1 Hudson Ave., Hudson, N. Y.
 • **IOWA MFG. CO.**, 916 16th St., N.E., Cedar Rapids, Iowa
 • **LIME INDUSTRY MANAGEMENT & ENGINEERING**, Hershey, Pa.
 • **SMITH ENGINEERING WORKS**, 332 E. Capitol Dr., Milwaukee 12, Wis.
 • **STURTEVANT MILL CO.**, 102 Clayton St., Boston 22, Mass.
 • **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

LINERS, Kiln (see Refractories)

LINERS, METAL, Grinding Mill

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
 • **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
 • **THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N. Y.
 • **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
 • **THE EIMCO CORP.**, P. O. Box 303, Salt Lake City 10, Utah
 • **ELECTRIC STEEL FOUNDRY CO.**, 2141 N. W. 25th Ave., Portland 10, Ore.
 • **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
 • **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
 • **KENSINGTON STEEL CO.**, 505 Kensington St., Chicago 28, Ill.
 • **THE MINE & SMELTER SUPPLY CO.**, 1422 17th St., Denver 17, Colo.
 • **F. L. SMITH & CO.**, 11 W. 42nd St., New York 18, N. Y.
 • **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.
 • **UNITED STATES STEEL CO.**, Pittsburgh 30, Pa.
 • **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.

LINERS, Pump, Metal

• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.
 • **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
 • **ELECTRIC STEEL FOUNDRY CO.**, 2141 N. W. 25th Ave., Portland 10, Ore.
 • **ELLCOTT MACHINE CORP.**, 1611 Bush St., Baltimore 30, Md.
 • **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
 • **MADSEN IRON WORKS, INC.**, 5631 Bickett St., Huntington Park, Calif.
 • **MECKUM ENGINEERING, INC.**, Dawson Rd., Ottawa, Ill.
 • **THE MINE & SMELTER SUPPLY CO.**, 1422 17th St., Denver 17, Colo.
 • **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.

LINERS, Pump, Rubber

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
 • **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
 • **THE FIRESTONE TIRE & RUBBER CO.**, 1200 Firestone Pkwy., Akron 17, Ohio
 • **GOODALL RUBBER CO.**, Whitehead Road, Trenton 4, N. J.
 • **THE MINE & SMELTER SUPPLY CO.**, 1422 17th St., Denver 17, Colo.
 • **QUAKER RUBBER CORP.**, Tacony and Comly Sts., Philadelphia 24, Pa.
 • **RAYBESTON - MANHATTAN, INC.**, 61 Willett St., Passaic, N. J.
 • **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N. Y.

LININGS, CHUTE (see Chute Linings)

LOADERS

1. Boat
 2. Car
 3. Truck
 • **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.
 3
 • **BARBER-GREENE CO.**, 631 W. Park Ave., Aurora, Ill.
 3
 • **BARRETT-CRAVENS CO.**, 4613 S. Western Blvd., Chicago 9, Ill.
 • **BONDED SCALE & MACHINE CO.**, 41 Bellview Ave., Columbus 7, Ohio
 1—2—3
 • **THE BRADY CONVEYORS CORP.**, 20 W. Jackson Blvd., Chicago 4, Ill.
 1—2—3
 • **CLYDE IRON WORKS, INC.**, P.O. Box 370, Duluth 1, Minn.
 3
 • **EAGLE CRUSHER CO., INC.**, 900 Harding Way E., Galion, Ohio
 3
 • **THE EIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah
 7—3—4
 • **GEORGE HAISS MFG. CO.**, Park Ave. & 143rd St., New York 51, N. Y.
 1—2—3
 • **THE FRANK G. HOUGH CO.**, Sunnyside Ave., Libertyville, Ill.
 2—3—4
 • **HYSTER CO.**, 2902 N. E. Clackamas, Portland 8, Ore.
 1—2—3
 • **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
 3
 • **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
 1—2
 • **LEWIS-SHEPARD PRODUCTS, INC.**, 206 Walnut St., Watertown 12, Mass.
 3
 • **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
 1—2—3
 • **MIXERMOBILE MANUFACTURERS**, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.
 2—3
 • **NORTHERN CONVEYOR CO.**, 327 W. State St., Jonesville, Wis.
 2—3
 • **O. K. CLUTCH & MACHINERY CO.**, Florence St., Columbia, Pa.
 3
 • **OTTUMWA BOX CAR LOADER CO.**, P.O. Box 417, Ottumwa, Iowa
 2

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

• **PETTIBONE MULLIKEN CORP.**, 4710 W. Division St., Chicago 51, Ill.
 2—3
 • **REVOLVATOR CO.**, 86th St. at U. S. Rts. 1 and 9, North Bergen, N. J.
 3
 • **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
 1—7—3
 • **TRACKSON COMPANY**, 3333 S. Chose Ave., Milwaukee 7, Wis.
 1—7—3
 • **TRACTOMOTIVE CORP.**, County Line Road, Deerfield, Ill.
 2—3
 • **TRIANGLE ENGINEERING CO.**, 2848 W. 26th St., Chicago 23, Ill.
 3
 • **TROWBRIDGE CONVEYOR CO.**, 851 Van Houten Ave., Clifton, N. J.
 1—2—3
 • **WEBSTER MFG. INC.**, Tiffin 16, Ohio
 2

LOADERS

1. Tractor
 2. Underground
 • **ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION**, P. O. Box 512, Milwaukee 1, Wis.
 1
 • **ATHEY PRODUCTS CORP.**, 5631 W. 65th St., Chicago 38, Ill.
 1
 • **BUCYRUS-ERIE CO.**, South Milwaukee, Wis.
 1
 • **BUTLER BIN CO.**, Box 407, Waukesha, Wis.
 1
 • **J. I. CASE CO.**, 700 State St., Racine, Wis.
 1
 • **CONSTRUCTION PRODUCTS CORP.**, 410 San Fernando Road, Los Angeles 31, Calif.
 1
 • **DROTT MFG. CORP.**, 3841 W. Wisconsin Ave., Milwaukee 8, Wis.
 1
 • **THE EIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah
 1—2
 • **GARDNER-DENVER CO.**, Quincy, Ill.
 2
 • **GEORGE HAYS MFG. CO.**, Park Ave. & 143rd St., New York 51, N. Y.
 1
 • **THE FRANK G. HOUGH CO.**, Sunnyside Ave., Libertyville, Ill.
 1
 • **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
 1
 • **JOY MANUFACTURING CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
 1—2
 • **THE KENT MACHINE CO.**, 1931 Thomas St., Cuyahoga Falls, O.
 2
 • **LULL MFG. CO.**, 3612 E. 44th St., Minneapolis 6, Minn.
 1
 • **MAINE STEEL INC.**, South Windham, Me.
 1
 • **MANDT MFG. CO.**, 490 W. Goodale St., Columbus 8, Ohio
 1
 • **THE OLIVER CORP., INDUSTRIAL DIV.**, 19300 Euclid Ave., Cleveland 17, Ohio
 1
 • **OTTAWA STEEL PRODUCTS CO.**, Ottawa, Kansas
 1
 • **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
 2
 • **SHEPPARD DIESELS**, Philadelphia 3, Pa.
 1
 • **SOUTHWEST WELDING & MFG. CO.**, 3201 W. Mission Road, Alhambra, Calif.
 1

• **TRACKSON COMPANY**, 3333 S. Chose Ave., Milwaukee 7, Wis.
 1—2
 • **TRACTOMOTIVE CORP.**, County Line Road, Deerfield, Ill.
 1
 • **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.
 1
 • **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.
 1

LOCOMOTIVES

1. Diesel
 2. Electric
 3. Gasoline
 4. Oil (L.P.G.)
 5. Storage Battery
 • **ATLAS CAR & MFG. CO.**, 1100 Ivanhoe Rd., Cleveland 10, Ohio
 1—2
 • **THE BALDWIN LOCOMOTIVE WORKS**, Philadelphia 42, Pa.
 1—2—3
 • **DAVENPORT BESLER CORP.**, 2305 Rockingham Rd., Davenport, Iowa
 1—2—3—4
 • **DIFFERENTIAL STEEL CAR CO.**, Findlay, Ohio
 1—2
 • **THE FATE-ROOT-HEATH CO.**, Plymouth, Ohio
 1—2—3—4
 • **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
 1
 • **INTERNATIONAL DIESEL ELECTRIC CO., INC.**, 13-02 44th Ave., Long Island City 1, N. Y.
 1—3
 • **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
 2—5
 • **LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP.**, South Main St., Lima, Ohio
 1
 • **MIDWEST STEEL CORP.**, Charleston 2, W. Va.
 1—3
 • **H. K. PORTER CO., INC.**, 49th & Harrison Sts., Pittsburgh 1, Pa.
 1—2—3—4—5
 • **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.
 1—2—3—4—5
 • **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.
 1—2—5
 • **THE WHITCOMB LOCOMOTIVE CO.**, 5th Ave. & 2nd St., Rochelle, Ill.
 1—2—3—5

LOCOMOTIVES

1. Diesel-Electric
 2. Gasoline-Electric
 3. Oil (L.P.G.)-Electric
 • **THE BALDWIN LOCOMOTIVE WORKS**, Philadelphia 42, Pa.
 1—2
 • **DAVENPORT BESLER CORP.**, 2305 Rockingham Rd., Davenport, Iowa
 1—2—3
 • **DIFFERENTIAL STEEL CAR CO.**, Findlay, Ohio
 1
 • **THE FATE-ROOT-HEATH CO.**, Plymouth, Ohio
 1—2
 • **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
 1—2—3
 • **H. K. PORTER CO., INC.**, 49th & Harrison Sts., Pittsburgh 1, Pa.
 1—2—3
 • **VULCAN IRON WORKS**, 700 So. Main St., Wilkes-Barre, Pa.
 1—2—3
 • **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.
 1—2—3
 • **THE WHITCOMB LOCOMOTIVE CO.**, 5th Ave. & 2nd St., Rochelle, Ill.
 1—2

LOG WASHERS, Aggregates (see Scrubbers)

LUBRICANTS, Grease, Oil, etc.

• **JOSEPH DIXON CRUCIBLE CO.**, 167 Wayne St., Jersey City 3, N. J.
 • **LUBRIPLATE DIV., FISKE BROS. REFINING CO.**, 129 Lockwood St., Newark 5, N. J.
 • **GREDA, INC.**, Gluck Building, Niagara Falls, N. Y.
 • **GULF OIL CORP.**, Gross St. & P. R. R., Pittsburgh 6, Pa.
 • **E. F. HOUGHTON & CO.**, 303 W. Lehigh Ave., Philadelphia 33, Pa.
 • **KEYSTONE LUBRICATING CO.**, 21st & Lipincott Sts., Philadelphia 32, Pa.
 • **MACMILLAN PETROLEUM CORP.**, 530 W. Sixth St., Los Angeles 14, Calif.
 • **THE PURE OIL CO.**, 35 E. Wacker Drive, Chicago 1, Ill.
 • **JOHN A. ROEBLING'S SONS CO.**, 640 S. Broad St., Trenton 2, N. J.
 • **SHELL OIL COMPANY**, 50 W. 50th St., New York 20, N. Y.
 • **SINCLAIR REFINING CO.**, 630 Fifth Ave., New York 20, N. Y.
 • **SOCO-VACUUM OIL CO.**, 26 Broadway, New York 4, N. Y.
 • **L. SONNEBORN SONS, INC.**, 300 Fourth Ave., New York 10, N. Y.
 • **STANDARD OIL CO. OF CALIF.**, 225 Bush St., San Francisco 20, Calif.
 • **STANDARD OIL OF INDIANA**, 91st & Lipincott Sts., Chicago 5, Ill.
 • **STANDARD OIL CO. (NEW JERSEY)**, 15 W. 51st St., New York 19, N. Y.
 • **STEWART-WARNER CORP.**, 1826 W. Diversey Parkway, Chicago 14, Ill.
 • **SUN OIL CO.**, 1608 Walnut St., Philadelphia 32, Pa.
 • **SWAN-FINCH OIL CO.**, 30 Rockefeller Plaza, New York, N. Y.
 • **THE TEXAS CO.**, 135 E. 42nd St., New York 17, N. Y.
 • **TIDE WATER ASSOCIATED OIL CO.**, 17 Battery Pl., New York 4, N. Y.
 • **THE WHITMORE MFG. CO.**, Box 1640, Station C, Cleveland 4, Ohio
 • **AMERICAN STEEL & WIRE CO.**, Rockefeller Bldg., Cleveland 13, Ohio
 • **JOSEPH DIXON CRUCIBLE CO.**, 167 Wayne St., Jersey City 3, N. J.
 • **LUBRIPLATE DIV., FISKE BROS. REFINING CO.**, 129 Lockwood St., Newark 5, N. J.
 • **GREDA, INC.**, Gluck Building, Niagara Falls, N. Y.
 • **E. F. HOUGHTON & CO.**, 303 W. Lehigh Ave., Philadelphia 33, Pa.
 • **KEYSTONE LUBRICATING CO.**, 21st & Lipincott Sts., Philadelphia 32, Pa.
 • **A. LESCHEN & SONS ROPE CO.**, 5909 Kennerly Ave., St. Louis 12, Mo.
 • **MACMILLAN PETROLEUM CORP.**, 530 W. Sixth St., Los Angeles 14, Calif.
 • **MACWYATT CO.**, 2949 14th Ave., Kenosha, Wis.
 • **THE PURE OIL CO.**, 35 E. Wacker Drive, Chicago 1, Ill.
 • **ROCHESTER ROPES INC.**, Culpeper, Va.

LUBRICANTS, Wire Rope

• **JOHN A. ROEBLING'S SONS CO.**, 640 S. Broad St., Trenton 2, N. J.
 • **SHELL OIL COMPANY**, 50 W. 50th St., New York 20, N. Y.
 • **L. SONNEBORN SONS, INC.**, 300 Fourth Ave., New York 10, N. Y.
 • **STANDARD OIL OF INDIANA**, 91st & Lipincott Sts., Chicago 5, Ill.
 • **STEWART-WARNER CORP.**, 1826 W. Diversey Parkway, Chicago 14, Ill.
 • **SUN OIL CO.**, 1608 Walnut St., Philadelphia 32, Pa.
 • **TIDE WATER ASSOCIATED OIL CO.**, 17 Battery Pl., New York 4, N. Y.
 • **THE WHITMORE MFG. CO.**, Box 1640, Station C, Cleveland 4, Ohio

LUBRICATING SYSTEMS

• **GRAY COMPANY, INC.**, 60 Eleventh Ave., N. E., Minneapolis 13, Minn.
 • **KEYSTONE LUBRICATING CO.**, 21st & Lipincott Sts., Philadelphia 32, Pa.
 • **LINCOLN ENGINEERING CO.**, 5701 Natural Bridge, St. Louis 20, Mo.
 • **OIL-RITE CORP.**, 3466 S. 13th St., Milwaukee 15, Wis.
 • **STEWART-WARNER CORP.**, 1826 W. Diversey Parkway, Chicago 14, Ill.

M

MAGNETIC SEPARATORS

• **AMERICAN CYANAMID CO.**, 30 Rockefeller Plaza, New York 20, N. Y.
 • **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio
 • **THE C. O. BARTLETT AND SNOW CO.**, 6200 Harvard Ave., Cleveland 5, Ohio
 • **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.
 • **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.
 • **DINGS MAGNETIC SEPARATOR CO.**, 509 E. Smith St., Milwaukee, Wis.
 • **THE ELECTRIC CONTROLLER & MFG. CO.**, 2700 E. 79th St., Cleveland 4, Ohio
 • **ERIEZ MANUFACTURING CO.**, 631 Commerce Bldg., Erie, Pa.
 • **GALENA MACHINE & ELECTRIC CO.**, 209-11 Main St., Galena, Kans.
 • **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio
 • **MAGNETIC ENGINEERING & MFG. CO.**, 851 Van Houten Ave., Clifton, N. J.
 • **PULVERIZING MACHINERY CO.**, Chatham Road, Summit, N. J.
 • **SEPARATIONS ENGINEERING CORP.**, 110 E. 42nd St., New York 17, N. Y.
 • **STEARNS MAGNETIC MFG. CO.**, 675 S. 28th St., Milwaukee 46, Wis.
 • **STEARNS-ROGERS MFG. CO.**, 1720 California St., Denver 2, Colo.
 • **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

MASONRY COLORS (see Cement and Masonry Colors)

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

MASONRY SAWS

- CHAMPION MANUFACTURING CO., 2028 Washington Ave., St. Louis 3, Mo.
- CLIPPER MFG. CO., 2807 Warwick, Kansas City 8, Mo.
- COLORCRETE INDUSTRIES, INC., 510 Ottawa Ave., Holland, Mich.
- CONSTRUCTION MACHINERY CO'3., Glenwood & Vinton Sts., Waterloo, Iowa
- STONE MACHINERY CO., INC., 399 Fayette St., Manlius, N. Y.
- VICTOR ENGINEERING CORP., 27 Maplewood Ave., Philadelphia 44, Pa.

MEASURING DEVICES

1. Weight
2. Volumetric (See Batches)
- CONSTRUCTION MACHINERY CO'3., Glenwood & Vinton Sts., Waterloo, Iowa
- 1-2
- THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
- 1
- NOBLE CO., 1860 Seventh St., Oakland 20, Calif.
- 1
- SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N. J.
- 1
- SINTERING MACHINERY CORP., Netcong, N. J.
- 1-2

METERS

1. Electric
2. Water
3. Other Fluids
- AUTOLENE LUBRICANTS CO., PROTEX DIVN., 1331 W. Evans Ave., Denver 9, Colo.
- 3
- AUTOMATIC LIQUID METER CO., 1372-1378 E. 15th St., Los Angeles 21, Calif.
- 2-3
- B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
- 1
- BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio
- 2-3
- THE BRISTOL CO., Waterbury 20, Conn.
- 1-2-3
- BUILDERS-PROVIDENCE, INC., 345 Harris Ave., Providence 1, R. I.
- 2
- CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
- 2
- THE FOXBORO CO., Neponset Ave., Foxboro, Mass.
- 3
- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
- 1
- THE HAYS CORP., East 8th St., Michigan City, Ind.
- 1-2-3
- HETHERINGTON & BERNER INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.
- 2-3
- MINNEAPOLIS - HONEYWELL REGULATOR CO., Wayne and Roberts Aves., Philadelphia 44, Pa.
- 1
- NEPTUNE METER CO., 50 W. 50th St., New York 20, N. Y.
- 2
- WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.
- 1
- WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.
- 2-3

MILLS, Grinding

1. Ball
2. Compartment
3. Laboratory
4. Rod
5. Roll
6. Tube
- ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.
- 1-3-4
- ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
- 1-4
- ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
- 1-2-4-5-6
- AMERICAN PULVERIZER CO., 1249 Macklind Ave., St. Louis 10, Mo.
- 3
- THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.
- 1-4
- THE BONNOT CO., 722 Mulberry S.E., Canton 2, Ohio
- 1-4
- BRADLEY PULVERIZER CO., 123 S. Third St., Allentown, Pa.
- 5
- CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.
- 1-3
- DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
- 1-3-4-5
- THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.
- 3
- EAGLE CRUSHER CO., INC., 900 Harding Way E., Gallon, Ohio
- 1-2-3-4-5-6
- THE EIMCO CORP., P. O. Box 300, Salt Lake City 10, Utah
- 1-4
- HAMMERMILLS, INC., DIV. OF PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.
- 5
- HARDINGE CO., INC., 240 Arch St., York, Pa.
- 1-2-3-4-5
- ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
- 3
- KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
- 1-2-3-4-5-6
- THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
- 1-3-4-6
- MORSE BROS. MACHINERY CO., 2900 Brighton Blvd., Denver 1, Colo.
- 1-3-4-6
- NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.
- 1-2-4-6
- THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio
- 1-3-4-6
- PENNSYLVANIA CRUSHER CO., Liberty Trust Bldg., Philadelphia 7, Pa.
- 3-5
- H. K. PORTER CO., INC., 49th & Harrison Sts., Pittsburgh 1, Pa.
- 1-2-3-4-5-6
- PULVERIZING MACHINERY CO., Chatham Road, Summit, N. J.
- 3
- RAYMOND PULVERIZER DIV., COMBUSTION ENG. CO., INC., 1315 N. Branch St., Chicago 22, Ill.
- 3-4
- F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
- 1-2-3-6
- STEARNS-ROGERS MFG. CO., 1720 California St., Denver 2, Colo.
- 1-3-3-4
- STEDMAN FOUNDRY & MACHINE CO., INC., Indiana Ave., Aurora, Ind.
- 1
- STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
- 1-3-6

- STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.
- 3-5
- TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.
- 1-2-4-6
- VULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.
- 1
- WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.
- 1-2-3

MILLS, Washing (see Scrubbers)

MILLS, Hammer (see Crushers, Hammer)

MIXER BODIES, Truck (see Bodies)

MIXERS, Concrete (see Concrete Mixers)

MIXERS, Plaster & Mortar

- C. H. & E. MFG. CO., 3849 N. Palmer St., Milwaukee 12, Wis.
- CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
- CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
- CONSTRUCTION MACHINERY CO'3., Glenwood & Vinton Sts., Waterloo, Iowa
- THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
- FLEMING MFG. CO., 4985 Fyler Ave., St. Louis, Mo.
- GILSON BROTHERS CO., Fredonia, Wis.
- THE JAEGER MACHINE CO., 550 W. Spring St., Columbus 16, Ohio
- THE KENT MACHINE CO., 1931 Thomas St., Cuyahoga Falls, Ohio
- THE KNICKERBOCKER CO., 603 Liberty St., Jackson, Mich.
- KWIK-MIX COMPANY, 235 W. Grand Ave., Port Washington, Wis.
- LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.
- MULTIPLEX MACHINERY CORP., Elmore, Ohio
- NOVERA, INC., 420 Lexington Ave., New York 17, N. Y.
- VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside, L. I., N. Y.
- WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

MIXERS, Pugmill

- BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.
- BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
- THE BONNOT CO., 722 Mulberry S.E., Canton 2, Ohio
- CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
- HETHERINGTON & BERNER INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.
- IOWA MFG. CO., 916 16th St., N.E., Cedar Rapids, Iowa
- THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio
- KWIK-MIX CO., 235 W. Grand Ave., Port Washington, Wis.
- MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.

- MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
- PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.
- W. A. RIDDELL CORP., Bucyrus, Ohio
- SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.
- SINTERING MACHINERY CORP., Netcong, N. J.
- F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
- SPROUT, WALDRON & CO., INC., Muncy, Pa.
- UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

MIXERS, Slurry (see Slurry Mixers)

MONITORS, Hydraulic

- GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.

MORTAR COLORS (see Cement & Masonry Colors)

MOTOR TRACTORS, Off-Highway

1. Diesel
2. Gas
- ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.
- 1-2
- ELWELL-PARKER ELECTRIC CO., 4205 St. Clair Ave., Cleveland 8, Ohio
- 2
- THE EUCLID ROAD MCHNRY. CO., 1361 Chardon Road, Cleveland 17, Ohio
- 1
- THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.
- 1-2
- INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.
- 1-2
- KOERNING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.
- 1-2
- R. G. LeTOURNEAU, INC., 2301 N. Adams St., Peoria, Ill.
- 1
- LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.
- 1-2
- M-R-S MANUFACTURING CO., P.O. Box 336, Flora, Miss.
- 1
- MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.
- 1-2
- MARMON-HERRINGTON CO., INC., 1511 W. Washington St., Indianapolis 7, Ind.
- 1-2
- MINNEAPOLIS-MOLINE CO., P. O. Box 1050, Minneapolis 1, Minn.
- 1
- WALTER MOTOR TRUCK CO., 1001 Irving Ave., Ridgewood, L. I., N. Y. (Brooklyn P. O.)
- 1-2
- WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
- 1
- THE WHITE MOTOR CO., 842 E. 79th St., Cleveland 1, Ohio
- 1-2

MOTOR TRUCK CONCRETE MIXERS (see Bodies)

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

MOTOR TRUCK DRIVES AND DIFFERENTIALS, Special

COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.
DAVEY COMPRESSOR CO., N. Water & Saginaw Sts., Kent, Ohio
DUPLEX TRUCK CO., 830 E. Hazel St., Lansing 4, Mich.
EATON MANUFACTURING CO., 739 East 140th St., Cleveland, Ohio
KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 11, Wash.
MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.
MARMON-HERRINGTON CO. INC., 1511 W. Washington St., Indianapolis 7, Ind.
TRUCK EQUIPMENT CO. INC., 1791 Fillmore Ave., Buffalo 14, N. Y.
UNIVERSAL TAMPERS INC., 1530 N. Adams St., Peoria 3, Ill.

MOTOR TRUCKS, Highway

AUTOCAR CO., Ardmore, Pa.
CHEVROLET MOTOR CO., General Motors Bldg., Detroit 2, Mich.
CONSERCO CO., River Road and 850 R.R., Washington, D. C.
COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.
DART TRUCK CO., Oak at 27th St., Kansas City 8, Mo.
DIAMOND T. MOTORTRUCK CO., 4517 W. 26th St., Chicago 23, Ill.
DODGE DIVISION, CHRYSLER CORP., 7900 Jos. Campeau St., Detroit 31, Mich.
DUPLEX TRUCK CO., 830 E. Hazel St., Lansing 5, Mich.
FEDERAL MOTOR TRUCK CO., 5780 Federal Ave., Detroit 9, Mich.
FORD MOTOR CO., Administration Bldg., Dearborn, Mich.
THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.
G. M. C. TRUCK & COACH DIV., YELW TRUCK & COACH MFG. CO., South Blvd., Pontiac 11, Mich.
INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.
KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 11, Wash.
LANDIS STEEL CO., 116 W. A St., Picher, Okla.
R. G. Létourneau, INC., 2301 N. Adams St., Peoria, Ill.
MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.
REG. MOTORS, INC., 1331 So. Washington Ave., Lansing, Mich.
STERLING MOTORS CORP., 2021 So. 54th St., Milwaukee 1, Wis.
THE WHITE MOTOR CO., 842 E. 79th St., Cleveland 1, Ohio
WILLIS-OVERLAND MOTORS, INC., Wolcott Blvd., Toledo 1, Ohio

MOTOR TRUCKS, Off-Highway End, Side, Bottom, Dump, Etc.

AUTOCAR CO., Ardmore, Pa.
CHEVROLET MOTOR CO., General Motors Bldg., Detroit 2, Mich.
COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.

DIAMOND T. MOTORTRUCK CO., 4517 W. 26th St., Chicago 23, Ill.
THE EUCLID ROAD MCHRY. CO., 1361 Chardon Road, Cleveland 17, Ohio
FEDERAL MOTOR TRUCK CO., 5780 Federal Ave., Detroit 9, Mich.
FORD MOTOR CO., Administration Bldg., Dearborn, Mich.
THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.
G. M. C. TRUCK & COACH DIV., YELW TRUCK & COACH MFG. CO., South Blvd., Pontiac 11, Mich.
INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.
KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 11, Wash.
KOEHRING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.
R. G. Létourneau, INC., 2301 N. Adams St., Peoria, Ill.
MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.
MARMON-HERRINGTON CO. INC., 1511 W. Washington St., Indianapolis 7, Ind.
REG. MOTORS, INC., 1331 So. Washington Ave., Lansing, Mich.
SCHONROCK EQUIPMENT MFG. CO., P.O. Box 1543, San Angelo, Texas
STERLING MOTORS CORP., 2021 So. 54th St., Milwaukee 1, Wis.
WALTER MOTOR TRUCK CO., 1001 Irving Ave., Ridgewood, L. I., N. Y. (Brooklyn P. O.)
WILLIS-OVERLAND MOTORS, INC., Wolcott Blvd., Toledo 1, Ohio
WOOLDRIDGE MFG. CO., Sunnyvale, Calif.

MOTOR TRUCK TRACTORS, Highway

1. Diesel
 2. Gasoline
AUTOCAR CO., Ardmore, Pa.
CHEVROLET MOTOR CO., General Motors Bldg., Detroit 2, Mich.
COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.
DIAMOND T. MOTORTRUCK CO., 4517 W. 26th St., Chicago 23, Ill.
DUPLEX TRUCK CO., 830 E. Hazel St., Lansing 5, Mich.
FEDERAL MOTOR TRUCK CO., 5780 Federal Ave., Detroit 9, Mich.
FORD MOTOR CO., Administration Bldg., Dearborn, Mich.
THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.
G. M. C. TRUCK & COACH DIV., YELW TRUCK & COACH MFG. CO., South Blvd., Pontiac 11, Mich.
INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.
KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 11, Wash.
M-R-S MANUFACTURING CO., P.O. Box 336, Florida, Miss.
MACK MFG. CORP., 350 Fifth Ave., New York 1, N. Y.
OTTAWA STEEL PRODUCTS CO., Ottawa, Kansas
 2

REG. MOTORS, INC., 1331 So. Washington Ave., Lansing, Mich.
STERLING MOTORS CORP., 2021 So. 54th St., Milwaukee 1, Wis.
THE WHITE MOTOR CO., 842 E. 79th St., Cleveland 1, Ohio
 1—2

MOTORS (see Electric Motors)

N

NOZZLES, Washing

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 2, N. Y.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
THE DEISTER CONCENTRATOR CO., P. O. Box 1, Fort Wayne 1, Ind.
DEISTER MACHINE CO., 1933 East Wayne St., Fort Wayne 4, Ind.
KNOX MFG. CO., 226 W. Clinton St., Oaklyn, N. J.
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
SPRAYING SYSTEMS CO., 3201 Randolph St., Bellwood, Ill.

NOZZLES, Water Heating

THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.

O

OFFBEARERS, Power, Concrete Block

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
BERGEN MACHINE & TOOL CO. INC., 189 Franklin St., Nutley 10, N. J.
BESSER MFG. CO., Alpena, Mich.
COLUMBIA MACHINE WORKS, 107 S. Grand Ave., Vancouver, Wash.
F. C. GEORGE MACHINE CO., 100 S. Westmoreland Dr., Orlando, Fla.
HYDRO-FOGED STONE ASSOCIATES, INC., 420 Bulkley Bldg., Cleveland 15, Ohio
THE KENT MACHINE CO., 1931 Thomas St., Cuyahoga Falls, Ohio
LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.
THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.
PRASCHAK MACHINE CO., Marshfield, Wis.
SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.
STEARNS MFG. CO. INC., 600 E. Beecher St., Adrian, Mich.
VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.
WITTEMANN MACHINERY CO., Paynters Road, Farmingdale, N. J.

OIL BURNERS

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.
CLEAVER-BROOKS CO., 326 E. Kettle Ave., Milwaukee 12, Wis.
COMBUSTION EQUIPMENT DIV., TODD SHIPYARDS CORP., 81-16 45th Ave., Elmhurst, Queens, N. Y.
COPPUS ENGINEERING CORP., 344 Park Ave., Worcester 2, Mass.

THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.
HAUCK MFG. CO., 124-136 Tenth St., Brooklyn 15, N. Y.
JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.
THE MACLEOD CO., 2232-40 Bogen St., Cincinnati 22, Ohio
MAHR MFG. CO. DIV. DIAMOND IRON WORKS, 1728 2nd St., No., Minneapolis 11, Minn.
NATIONAL AIRCOIL BURNER CO., 1298 E. Sedgley Ave., Philadelphia 34, Pa.
RAY OIL BURNER CO., 401 Bernal Ave., San Francisco 12, Calif.
SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.
L. SMITH CO., 11 W. 42nd St., New York 18, N. Y.
STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

OIL FILTERS

DIAMOND IRON WORKS, INC., 1728 2nd St., No., Minneapolis 11, Minn.
FRAM CORPORATION, Providence 16, R. I.
HARDING CO., INC., 240 Arch St., York, Pa.
HONAN-CRANE CORP., 600 Washburn Ave., Lebanon, Ind.
LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.
STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

OIL, Lubricants (see Lubricants)

P

PALLETS, Concrete Products

1. Steel
 2. Wood
 3. Other
ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
BERGEN MACHINE & TOOL CO. INC., 189 Franklin Ave., Nutley 10, N. J.
BESSER MFG. CO., Alpena, Mich.
CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.
CHASE FDRY. & MFG. CO., 2100 Parsons Ave., Columbus 7, Ohio
THE COMMERCIAL SHEARING & STAMPING CO., P. O. Box 719, Youngstown 1, Ohio
ROY DARDEN INDUSTRIES, INC., P. O. Box 95, North Side branch, Atlanta 3, Ga.
THE DOW CHEMICAL CO., Midland, Mich.
FABRICATORS STEEL & MFG. CORP., 850 E. 133rd St., Bronx 54, N. Y.
FLEWING MFG. CO. INC., 4985 Fyler Ave., St. Louis 9, Mo.
FRANKS PATTERN & FOUNDRY CO., 2201 E. Artesia St., Long Beach 5, Calif.
THE FROG, SWITCH & MFG. CO., Carlisle, Pa.
GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J.
F. C. GEORGE MACHINE CO., INC., 100 S. Westmoreland Dr., Orlando, Fla.
 3

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

HYDRO-FORGED STONE ASSOCIATES, INC., 470 Bulky Bldg., Cleveland 15, Ohio

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

• **THE KIRK & BLUM MFG. CO.**, 2838 Spring Grove Ave., Cincinnati 25, Ohio

• **LEWIS - SHEPARD PRODUCTS INC.**, 206 Walnut St., Watertown 72, Mass.

• **LIFETIME BUILDING SPECIALTIES INC.**, 519 Brock Haven Dr., Orlando, Fla.

• **THE MILES MFG. CO.**, P. O. Box 65, Jackson, Mich.

• **MISHCO CORP.**, 615 SW 2nd Ave., Miami, Fla.

• **MULTIPEX MACHINERY CORP.**, Elmore, Ohio

• **PRASCHAK MACHINE CO.**, Marshfield, Wis.

• **SOUTHEAST STEEL SALES CO.**, 437 N. Garland St., Orlando, Fla.

• **SOUTHERN INDUSTRIAL DIECASTING CO.**, 4th Street S.W. (P. O. Box 363) Moultrie, Ga.

• **STEARNS MFG. CO., INC.**, 600 E. Beecher St., Adrian, Mich.

• **UNIVERSAL CONCRETE MCHY. CO., INC.**, 297 S. High St., Columbus 15, Ohio

• **VAN ORNUM CO.**, 344 Haddon Ave., Westmont, N. J.

• **WITTEMANN MACHINERY CO.**, Painters Road, Farmingdale, N. J.

PALLET CLEANERS

• **BERGEN MACHINE & TOOL CO.**, 139 Franklin Ave., Nutley 10, N. J.

• **BESSER MFG. CO.**, 205 47th St., Alpena, Mich.

• **COLUMBIA MACHINE WORKS**, 107 S. Grand Ave., Vancouver, Wash.

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

• **SPRINGFIELD PALLET CLEANER & MFG. CO.**, 501 Southwood Drive., Springfield, Ohio

PANEL BOARDS, Electric

• **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

• **THE HAYS CORP.**, E. 8th St., Michigan City, Ind.

• **THE KIRK & BLUM MFG. CO.**, 2838 Spring Grove Ave., Cincinnati 25, Ohio

• **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

PANS, GRINDING, Wet and Dry

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.

• **THE PATTERSON FOUNDRY & MACHINE CO.**, 1250 St. George St., East Liverpool, Ohio

• **W. A. RIDDELL CORP.**, Bucyrus, Ohio

• **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.

PANS, APRON, CONVEYOR (see Conveyors, Apron)

PERFORATED METAL (see Screen Plate)

PHOTO-ELECTRIC CELLS

• **THE CONVEYOR CO.**, 3260 East Slauson Ave., Los Angeles 11, Calif.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

• **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (see Blocks, Pillow)

PIPE, Asbestos

• **JOHNS-MANVILLE**, 22 E. 40th St., New York 16, N. Y.

• **QUIGLEY COMPANY, INC.**, 577 Fifth Ave., New York 17, N. Y.

• **AMERICAN STEEL DREDGE CO., INC.**, 2511 Taylor St., Fort Wayne 6, Ind.

• **ELLICOTT MACHINE CORP.**, 1611 Bush St., Baltimore 30, Md.

• **THE FLORI PIPE CO.**, 601-29 E. Red Bud Ave., St. Louis 15, Mo.

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

• **MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.

• **NAYLOR PIPE CO.**, 1237 East 92nd St., Chicago 19, Ill.

• **REPUBLIC STEEL CORP.**, Republic Bldg., Cleveland 1, Ohio

• **TAYLOR FORGE & PIPE WORKS**, P. O. Box 485, Chicago 90, Ill.

PIPE FITTINGS

• **BARCO MFG. CO.**, 1801 W. Winemac Ave., Chicago 40, Ill.

• **THE CRANE CO.**, 836 S. Michigan Ave., Chicago 5, Ill.

• **ELECTRIC STEEL FOUNDRY CO.**, 2141 N. W. 25th Ave., Portland 10, Ore.

• **THE FLORI PIPE CO.**, 601-29 E. Red Bud Ave., St. Louis 15, Mo.

• **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.

• **MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.

• **NAYLOR PIPE CO.**, 1237 East 92nd St., Chicago 19, Ill.

• **TAYLOR FORGE & PIPE WORKS**, P. O. Box 485, Chicago 90, Ill.

• **VICTAULIC CO. OF AMERICA**, 30 Rockefeller Plaza, New York 20, N. Y.

• **WALWORTH CO.**, 60 East 42nd St., New York 17, N. Y.

• **R. D. WOOD CO.**, 1072 Public Ledger Bldg., Philadelphia 5, Pa.

• **PIPE, Rubber Lined**

• **THE LIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah

• **THE GATES RUBBER CO.**, 999 S. Broadway, Denver 17, Colo.

• **GOODALL RUBBER CO.**, Whitehead Road, Trenton 4, N. J.

• **B. F. GOODRICH CO.**, Akron 11, Ohio

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

• **HEWITT RUBBER DIV., HEWITT-ROBINS, INC.**, 240 Kensington Ave., Buffalo 5, N. Y.

• **NAYLOR PIPE CO.**, 1237 East 92nd St., Chicago 19, Ill.

• **RAYBESTOS - MANHATTAN, INC.**, 61 Willett St., Passaic, N. J.

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N. Y.

PLANERS, Shale

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

PLASTER MACHINERY

• **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.

• **NOVERA, INC.**, 420 Lexington Ave., New York 17, N. Y.

PLASTER MIXERS (see Mixers, Plaster)

PNEUMATIC CONVEYORS (see Conveyors, Air)

POLISHING MACHINES, Concrete

• **STOW MANUFACTURING CO.**, 49 Shear St., Binghamton, N. Y.

PONTOONS, Dredge and Pipe

• **AMERICAN STEEL DREDGE CO., INC.**, 2511 Taylor St., Fort Wayne 6, Ind.

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

• **ELLICOTT MACHINE CORP.**, 1611 Bush St., Baltimore 30, Md.

• **HETHERINGTON & BERNER INC.**, 701-745 Kentucky Ave., Indianapolis 7, Ind.

• **INGALLS SHIPBUILDING CORP.**, P. O. Drawer 2638, Birmingham 2, Ala.

• **MANITOWOC ENGINEERING WORKS**, Manitowoc, Wis.

• **MECKUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.

• **NAYLOR PIPE CO.**, 1237 East 92nd St., Chicago 19, Ill.

PORTABLE AGGREGATES PLANTS, Crushing & Screening Plants (see Crushing & Screening Plants, Mobile Mounted)

POWDER, Blasting (see Explosives & Dynamite)

POWER STATION EQUIPMENT

• **ALLEN - SHERMAN - HOFF CO.**, Lewis Tower Bldg., Philadelphia 2, Pa.

• **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.

• **BAILEY METER CO.**, 1050 Ivonhoe Road, Cleveland 10, Ohio

• **DE LAVAL STEAM TURBINE CO.**, Trenton 2, N. J.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

• **THE HAYS CORP.**, East 8th St., Michigan City, Ind.

• **INTERNATIONAL DIESEL ELECTRIC CO., INC.**, 13-02 44th Ave., Long Island City 1, N. Y.

• **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio

• **PENNSYLVANIA CRUSHER CO.**, Liberty Trust Bldg., Philadelphia 7, Pa.

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

• **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

PRECIPITATORS, Dust, Electrical (see Dust Collectors, Electrical)

PREHEATERS, for Kilns, etc.

• **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N. Y.

• **THE PATTERSON FOUNDRY & MACHINE CO.**, 1250 St. George St., East Liverpool, Ohio

• **POSEY IRON WORKS, INC., INDUSTRIAL HEATING DIVN.**, 560 S. Prince St., Lancaster, Pa.

• **F. L. SMITH CO.**, 11 W. 42nd St., New York 18, N. Y.

PROPORTIONING EQUIPMENT (see Bathers)

PROTECTIVE COATINGS

• **BLUE RIDGE TALC CO. INC.**, P. O. Box 7, Henry 6, Va.

• **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

• **A. C. HORN CO., INC.**, 10th St. & 44th Ave., Long Island City 1, N. Y.

• **E. F. HOUGHTON & CO.**, 303 W. Lehigh Ave., Philadelphia 33, Pa.

• **JOHNS-MANVILLE**, 22 E. 40th St., New York 16, N. Y.

• **KOPPERS CO., INC.**, Koppers Bldg., Pittsburgh 19, Pa.

• **LUKENS STEEL CO.**, 521 Lukens Bldg., Coatesville, Pa.

• **THE MASTER BUILDERS CO.**, 1760 Euclid Ave., Cleveland 3, Ohio

• **GEO. R. MOWAT CO.**, 24-26 W. 40th St., New York 18, N. Y.

• **QUIGLEY COMPANY, INC.**, 527 Fifth Ave., New York 17, N. Y.

• **L. SONNEBORN SONS, INC.**, 300 Fourth Ave., New York 10, N. Y.

• **SPRAY-O-BOND COMPANY**, 2225 N. Humboldt Ave., Milwaukee 12, Wis.

• **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

PULLERS, Car (see Car Movers)

PULLERS, Gear, Wheel & Bearing

• **ARMSTRONG-BRAY & CO.**, 5364 Northwest Highway, Chicago 30, Ill.

• **STEARNS - ROGERS MFG. CO.**, 1720 California St., Denver 2, Colo.

PULLEYS, Clutch

• **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.

• **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.

• **DIAMOND IRON WORKS, INC.**, 1728 2nd St., No., Minneapolis 11, Minn.

• **DODGE MANUFACTURING CORP.**, Mishawaka, Ind.

• **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.

• **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.
MINNEAPOLIS-MOLINE CO., P. O. Box 1050, Minneapolis 1, Minn.
WEBSTER MFG. INC., Tiffin 16, Ohio

PULLEYS, Conveyor and Elevator

THE AMERICAN PULLEY CO., 4200 Wissachickon Ave., Philadelphia 29, Penna.
ANDERSON ENGINEERING CO., 237 Cent St., Cambridge 41, Mass.
THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.
CONTINENTAL GIN CO., P. O. Box 2514, Birmingham, Ala.
THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.
R. & J. DICK CO., INC., P. O. Box 388, Passaic, N. J.
DODGE MANUFACTURING CORP., Mishawaka, Ind.
THE J. B. ENHSAM & SONS MFG. CO., Enterprise, Kans.
THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.
GENERAL CONVEYOR & MFG. CO., 3501 Salena St., St. Louis 18, Mo.
GEORGE HAISS MFG. CO., INC., Park Ave. and 143rd St., New York 51, N. Y.
HARDSOGG PNEUMATIC TOOL CO., 225 So. Benton St., Ottumwa, Iowa
THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.
IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.
FRANK A. KREMSER & SONS, INC., 3435-45 N. 5th St., Philadelphia 40, Pa.
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.
MCLANAHAN AND STONE CORP., Hollidaysburg, Pa.
MENALLY - PITTSBURGH MFG. CORP., Pittsburgh, Kans.
NORTHERN CONVEYOR CO., 327 W. State St., Janesville, Wis.
PLYOTT FOUNDRY & MACHINE CO., 328 No. Sangamon St., Chicago 7, Ill.
ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
SPROUT, WALDRON & CO., INC., Muncy, Pa.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
WEBSTER MFG. INC., Tiffin 16, Ohio

PULLEYS, Magnetic (see Magnetic Separators)

PULP DENSITY CONTROLLERS

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

PULVERIZER FUEL SYSTEMS (see Coal Pulverizing Equipment, Direct Firing)

PULVERIZERS (see Mills)

PUMPS, Air Lift

1. Cement
 2. Slurry
 3. Water
AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.
CONSTRUCTION MACHINERY CO.'S, Glenwood & Vinton Sts., Waterloo, Iowa
DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.
DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N. Y.
FULLER COMPANY, Fuller Bldg., Catasauqua, Pa.
GARDNER-DENVER CO., Quincy, Ill.
 1-2-3
INDEPENDENT PNEUMATIC TOOL CO., 175 State St., Aurora, Ill.
INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.
 2-3
LAWRENCE MACHINE & PUMP CORP., 371 Market St., Lawrence, Mass.
 2-3
ROBINSON AIR-ACTIVATED CONVEYOR SYSTEMS, 205 E. 42nd St., New York 17, N. Y.
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 1-2

PUMPS, Asphalt

HETHERINGTON & BERNER INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.
IOWA MFG. CO., 916 16th St., N.E., Cedar Rapids, Iowa
LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.

MADSEN IRON WORKS, INC., 5631 Bickett St., Huntington Park, Calif.
H. K. PORTER CO., INC., 49th & Harrison Sts., Pittsburgh 1, Pa.
WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

PUMPS, Cement

FULLER COMPANY, Fuller Bldg., Catasauqua, Pa.
GARDNER-DENVER CO., Quincy, Ill.
KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.
ROBINSON AIR-ACTIVATED CONVEYOR SYSTEMS, 205 E. 42nd St., New York 17, N. Y.
F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

PUMPS, Concrete

CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
GARDNER-DENVER CO., Quincy, Ill.
LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.

PUMPS, Dredge

ALLEN-SHERMAN-HOFF CO., Lewis Tower Bldg., Philadelphia 2, Pa.
ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.
AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 6, Ind.
B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
BUCRYUS-ERIE CO., South Milwaukee, Wis.
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
ELLCOTT MACHINE CORP., 1611 Bush St., Baltimore 30, Md.
ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N. Y.
FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.
HETHERINGTON & BERNER INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.
BYRON JACKSON CO., 2301 E. Vernon Ave., Los Angeles 11, Calif.
KANSAS CITY HAY PRESS CO., 801 Woodsworth Road, Kansas City 6, Mo.
LAWRENCE MACHINE & PUMP CORP., 371 Market St., Lawrence, Mass.
MCKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.
MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.
MORRIS MACHINE WORKS, Baldwinville, N. Y.
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.
YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

PUMPS, Sand

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
ALLEN-SHERMAN-HOFF CO., Lewis Tower Bldg., Philadelphia 2, Pa.
ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
THE DORR CO., INC., Barry Place, Stamford, Conn.
ELLCOTT MACHINE CORP., 1611 Bush St., Baltimore 30, Md.
ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N. Y.
GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.
HETHERINGTON & BERNER INC., 701-745 Kentucky Ave., Indianapolis 7, Ind.
BYRON JACKSON CO., 2301 E. Vernon Ave., Los Angeles 11, Calif.
KANSAS CITY HAY PRESS CO., 801 Woodsworth Road, Kansas City 6, Mo.
LAWRENCE MACHINE & PUMP CORP., 371 Market St., Lawrence, Mass.
MCKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.
MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.
THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
PEKOR IRON WORKS, Ft. of E. 9th St., Columbus, Ga.
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
WESTERN MACHINERY CO., 760-765 Folsom St., San Francisco 7, Calif.
A. R. WILFLEY & SONS, INC., P. O. Box 2330, Denver 1, Colo.
YUBA MFG. CO., 351 California St., San Francisco 4, Calif.

PUMPS, Slurry

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
ALLEN-SHERMAN-HOFF CO., Lewis Tower Bldg., Philadelphia 2, Pa.
ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
THE DORR CO., INC., Barry Place, Stamford, Conn.
ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N. Y.
GALENA MACHINE & ELECTRIC CO., 209-11 Main St., Galena, Kans.
GARDNER-DENVER CO., Quincy, Ill.
GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.
GOULDS PUMPS, INC., 300 Fall St., Seneca Falls, N. Y.
INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.
BYRON JACKSON CO., 2301 E. Vernon Ave., Los Angeles 11, Calif.
KOENIGING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.
LAWRENCE MACHINE & PUMP CORP., 371 Market St., Lawrence, Mass.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.
 •THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
 MORRIS MACHINE WORKS, Baldwinville, N. Y.
 McNALLY-PITTSBURG MFG. CORP., Pittsburg, Kans.
 •PETTIBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.
 H. K. PORTER CO., INC., 49th & Harrison Sts., Pittsburgh 1, Pa.
 •F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 •TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
 •WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
 •A. R. WILFLEY & SONS, INC., P. O. Box 2330, Denver 1, Colo.
 •WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

PUMPS

1. Centrifugal
 2. Deep Well
 3. Diaphragm
 4. Rubber-Lined
 5. Vacuum
 6. Hydraulic
 •ALLEN-SHERMAN-HOFF CO., Lewis Tower Bldg., Philadelphia 2, Pa.
 •ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
 •ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
 1-4-5
 AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
 1
 B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.
 1
 BIRDSBORO STEEL FOUNDRY & MACHINE CO., Birdsboro, Pa.
 1
 C. H. & E. MFG. CO., 3849 N. Palmer St., Milwaukee 12, Wis.
 1-3
 CARVER PUMP CO., 1056 Hershey Ave., Muscatine, Iowa
 1-3
 CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.
 5
 •CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
 1-3
 •CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.
 5
 CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Conneltsville, Pa.
 2
 CONSTRUCTION MACHINERY CO'S., Glenwood & Vinton Sts., Waterloo, Iowa
 1-3
 DEAN BROTHERS PUMPS INC., 323 W. 10th St., Indianapolis 7, Ind.
 1
 DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.
 1-4-6
 •DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
 1-3-4
 •THE DORR CO., INC., Barry Place, Stamford, Conn.
 3-4
 •ELLCOTT MACHINE CORP., 1611 Bush St., Baltimore 30, Md.
 1
 ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N. Y.
 1

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
 1-2
 FREDERICK IRON & STEEL CO., Frederick, Md.
 •FULLER COMPANY, Fuller Bldg., Catonsville, Pa.
 5
 GALENA MACHINE & ELECTRIC CO., 209-11 Main St., Galena, Kans.
 1-3
 •GARDNER-DENVER CO., Quincy, Ill.
 1-5
 GARWOOD INDUSTRIES, INC., WAYNE DIV., Wayne, Mich.
 5
 GENERAL SCIENTIFIC EQUIPMENT CO., 27th and Huntingdon Sts., Philadelphia 32, Pa.
 3
 GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.
 •GOODALL RUBBER CO., Whitehead Road, Trenton 4, N. J.
 4
 THE GORMAN-RUPP CO., 305 Bowman St., Mansfield, Ohio
 1
 GOULDS PUMPS, INC., 300 Fall St., Seneca Falls, N. Y.
 •HARDING CO., INC., 240 Arch St., York, Pa.
 3
 HAMELITE CORP., Riverdale Ave., Port Chester, N. Y.
 1
 INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.
 1-5
 BYRON JACKSON CO., 2301 E. Vennin Ave., Los Angeles 11, Calif.
 1-2
 JACUZZI BROS. INC., 5327 Jacuzzi Ave., Richmond, Calif.
 1-2
 •THE JAEGER MACHINE CO., 550 W. Spring St., Columbus 16, Ohio
 1-3
 KANSAS CITY MAY PRESS CO., 801 Woodswether Road, Kansas City 6, Mo.
 1
 KEYSTONE DRILLER CO., 8th Ave., Beaver Falls, Pa.
 6
 LAPLANT-CHOATE MFG. CO., INC., 2920 1st Ave. N. E., Cedar Rapids, Iowa
 6
 LAWRENCE MACHINE & PUMP CORP., 371 Market St., Lawrence, Mass.
 LINCOLN ENGINEERING CO., 5701 Natural Bridge, St. Louis 20, Mo.
 6
 MARLOW PUMPS, 568 Greenwood Ave., Ridgewood, N. J.
 1
 MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.
 •THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
 1-3
 MORRIS MACHINE WORKS, Baldwinville, N. Y.
 1-4
 MORSE BROS. MACHINERY CO., 2900 Brighton Blvd., Denver 1, Colo.
 1-2
 McNALLY-PITTSBURG MFG. CORP., Pittsburg, Kans.
 •NORDBERG MFG. CO., 3073 S. Chose Ave., Milwaukee 7, Wis.
 1
 NOVO ENGINE CO., 702 Porter St., Lansing 5, Mich.
 1-2
 OLIVER UNITED FILTERS INC., 33 W. 42nd St., New York 18, N. Y.
 1-3-5
 PEERLESS PUMP DIV. FOOD MACH'Y & CHEM. CORP., 301 West Ave. 26, Los Angeles 31, Calif.
 1-2

H. K. PORTER CO., INC., 49th & Harrison Sts., Pittsburgh 1, Pa.
 1-4
 QUINCY COMPRESSOR CO., 217 Maine St., Quincy, Ill.
 5
 RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.
 4
 RODGERS HYDRAULIC INC., 7401 Walker St., Minneapolis 16, Minn.
 6
 STERLING MACHINERY CORP., 411 Southwest Blvd., Kansas City 8, Mo.
 1
 •TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
 1
 UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
 1-2
 VICKERS INC. DIV. SPERRY CORP., 1400 Oakman Blvd., Detroit 32, Mich.
 8
 •WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
 1-3-4
 •A. R. WILFLEY & SONS, INC., P. O. Box 2330, Denver 1, Colo.
 1-4
 •WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.
 1-2-5
 •YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
 1

PYROMETERS

•BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio
 THE BRISTOL CO., Waterbury 20, Conn.
 CAMBRIDGE INSTRUMENT CO. INC., 3765 Grand Central Terminal, New York 17, N. Y.
 THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.
 CHARLES ENGELHARD, INC., 850 Passaic Ave., East Newark, N. J.
 THE FOXBORO CO., Neponset Ave., Foxboro, Mass.
 •GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
 LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.
 1
 MINNEAPOLIS - HONEYWELL REGULATOR CO., BROWN INSTRUMENTS DIV., Wayne & Windrim Aves., Philadelphia 44, Pa.
 PYROMETER INSTRUMENT CO., INC., 92 Portland Ave., Bergenfield, N. J.
 •F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
 TAMMIS INDUSTRIES, INC., 228 No. LaSalle St., Chicago 1, Ill.
 THWING-ALBERT INSTRUMENT CO., Penn St. & Pulaski Ave., Philadelphia 44, Pa.
 WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.
 WHEELCO INSTRUMENTS CO., 847 W. Harrison St., Chicago 7, Ill.

R

RACKS, Curing, Concrete Masonry

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
 •BESSER MFG. CO., Alpena, Mich.
 •CAMPTION FUEL ENG. DIV., P. O. Box 3941P, Detroit 17, Mich.

CHASE CONCRETE MACHINERY CO., 15 Linwood Ave., Buffalo 2, N. Y.
 THE CHASE FOUNDRY & MFG. CO., 2300 S. Parsons Ave., Columbus 7, Ohio
 •COLUMBIA MACHINE WORKS, 107 S. Grand Ave., Vancouver Wash.
 •ROY DARDEN INDUSTRIES, INC., P. O. Box 95, North Side Branch, Atlanta 3, Ga.
 •FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo.
 GENERAL ENGINES CO., INC., 307 Hunter St., Gloucester, N. J.
 •THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio
 THE KIRK & BLUM MFG. CO., 2835 Spring Grove Ave., Cincinnati 25, Ohio
 LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.
 THE MILES MFG. CO., P. O. Box 65, Jackson, Mich.
 •MULTIPLY MACHINERY CORP., Elmore, Ohio
 SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.
 VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.
 •WITTEMAN MACHINERY CO., Paynters Road, Farmingdale, N. J.

RAILS, Relay

BIRMINGHAM RAIL & LOCOMOTIVE CO., P.O. Box 391, Birmingham 1, Ala.
 COMMERCIAL METALS CO., Latimer at Corinth St., Dallas, Texas
 L. B. FOSTER CO., P. O. Box 1647, Pittsburgh 30, Pa.
 MIDWEST STEEL CORP., Charleston 2, W. Va.

RAILWAY, Industrial Equipment

ATLAS CORPORATION, Mountville, Pa.
 BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.
 BIRMINGHAM RAIL & LOCOMOTIVE CO., P.O. Box 391, Birmingham 1, Ala.
 EASTON CAR & CONSTRUCTION CO., Easton, Pa.
 L. B. FOSTER CO., P. O. Box 1647, Pittsburgh 30, Pa.
 MIDWEST STEEL CORP., Charleston 2, W. Va.
 PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.

RAILWAYS, Electric

•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
 WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

READY-MIXED CONCRETE PLANTS (see Batching Plants)

READY MIXED TRUCKS (see Bodies, Ready Mixed Concrete)

RECORDERS, Concrete Batching

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.
 THE HETZEL STEEL FORM & IRON CO., 1750 Thomas Rd., Warren, Ohio

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

•THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
•NOBLE CO., 1860 Seventh St., Oakland 20, Calif.

RECORDERS

1. Draft
 2. Pressure
 3. Temperature
- BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio
1—2—3
•THE BRISTOL CO., Waterbury 20, Conn.
1—2—3
•THE FOXBORO CO., Neponset Ave., Foxboro, Mass.
2—3
•THE HAYS CORP., East 8th St., Michigan City, Ind.
1—2
•LEEDS & NORTHROP CO., 4970 Stanton Ave., Philadelphia 44, Pa.
1—2—3
•MANNING, MAXWELL & MOORE, INC., 11 Elias St., Bridgeport 2, Conn.
2—3
•MINNEAPOLIS - HONEYWELL REGULATOR CO., BROWN INSTRUMENTS DIV., Wayne & Windrim Aves., Philadelphia 44, Pa.
1—2—3
•NOBLE CO., 1860 Seventh St., Oakland 20, Calif.
1—2—3
•PYROMETER INSTRUMENT CO., INC., 92 Portland Ave., Bergenfield, N. J.
3
•THWING-ALBERT INSTRUMENT CO., Penn St. & Pulaski Ave., Philadelphia 44, Pa.
3
•WHEELCO INSTRUMENTS CO., 547 W. Harrison St., Chicago 7, Ill.
3

RECTIFIERS, Electric

- ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
•I-T-E CIRCUIT BREAKER CO., 19th and Hamilton St., Philadelphia 30, Pa.
•SYNTRON CO., 450 Lexington Ave., Homer City, Pa.
•WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

RECUPERATORS, Waste Heat

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

REFRATORIES, Block, Brick, Insulation

- AMERICAN VERMICULITE CORP., 654 Madison Ave., New York 21, N. Y.
•THE BARCOCK & WILCOX CO., 55 Liberty St., New York 6, N. Y.
•BOTFIELD REFRATORIES CO., Swanson & Clymer Sts., Philadelphia 47, Pa.
•THE CARBORUNDUM CO., REFRATORIES DIV., Perth Amboy, N. J.
•THE CARTER-WATERS CORP., 2440 Pennway, Kansas City 8, Mo.
•CHICAGO FIRE BRICK CO., 1467 Elston Ave., Chicago 22, Ill.
•DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.
•THE DENVER FIRE CLAY CO., 2301 Blake St., Denver 17, Colo.
•ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

GENERAL REFRATORIES CO., 405 Atlas Bldg., Salt Lake City 1, Utah

A. P. GREEN FIRE BRICK CO., 1018 E. Breckenridge, Mexico, Mo.

HARRISON - WALKER REFRATORIES CO., 1800 Farmers Bank Bldg., Pittsburgh 22, Pa.

HYDRO-FORGED STONE ASSOCIATES, INC., 470 Bulkley Bldg., Cleveland 15, Ohio

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N. Y.

LACLEDE-CHRISTY CO., Iroquois Bldg., 3600 Forbes St., Pittsburgh 13, Pa.

MEXICO REFRATORIES CO., Better Refractories Bldg., Mexico, Mo.

THE PATTERSON FOUNDRY & MACHINE CO., 1750 St. George St., East Liverpool, Ohio

PUMICE REEPAULATE SALES CORP., 121 S. Yale Ave., Albuquerque, New Mex.

QUIGLEY COMPANY, INC., 527 Fifth Ave., New York 17, N. Y.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

REFRATORY & INSULATION CORP., 120 Wall St., New York 5, N. Y.

RICHARD C. REMMEY SON CO., Hertley St. & Delaware River, Philadelphia 24, Pa.

W. A. RIDDELL CORP., Bucyrus, Ohio

THE RUBERUID CO., 500 Fifth Ave., New York 18, N. Y.

WALSH REFRATORIES CORP., 101 Ferry St., St. Louis 7, Mo.

ZONOLITE COMPANY, 135 So. LaSalle St., Chicago 3, Ill.

REGULATORS, Feed Water

WOSHER ELECTRONIC CONTROLS, 75 Boston Post Rd., Larchmont, N. Y.

REGULATORS, Draft, Pressure, Temperature (see Controls)

REGULATORS, Voltage

- ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

RESPIRATORS

- AMERICAN OPTICAL CO., Mechanic St., Southbridge, Mass.
•THE DEVILBISS CO., 300 Phillips Ave., Toledo 1, Ohio
•GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntington Sts., Philadelphia 32, Pa.
•WILLSON PRODUCTS, INC., 248 Washington St., Reading, Pa.

REVOLUTION COUNTERS (see Tachometers)

REVOLVING CRANES (See Derricks, Stiffleg or Guy)

RHEOSTATS

- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.
•WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

ROCK WOOL CUPOLAS & EQUIPMENT

WHITING CORP., 15693 Lathrop Ave., Harvey, Ill.

RODS, for Grinding Mills

- ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.
•THE COLORADO FUEL & IRON CORP., P. O. Box 1920, Denver 1, Colo.
•DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
•HARDING CO., INC., 240 Arch St., York, Pa.
•MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
•THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
•TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

RODS, Welding, Hard-facing (see Welding Rods, Hard-facing)

RODS, Welding (see Welding Rods and Electrodes)

ROLLER BEARINGS (see Bearings)

ROOFING AND SIDING, Industrial

- THE BARRETT DIV., ALLIED CHEMICAL & DYE CORP., 40 Rector St., New York 6, N. Y.
•BASALT ROCK CO., INC., 8th & River Sts., Napa, Calif.
•BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.
•JOHNS-MANVILLE, 22 E. 40th St., New York 16, N. Y.
•KOPPERS CO., INC., Koppers Bldg., Pittsburgh 19, Pa.
•REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio
•THE RUBERUID CO., 500 Fifth Ave., New York 18, N. Y.
•JOSEPH T. RYERSON & SON, INC., 2558 West 16th St., Chicago 80, Ill.
•TRUSCON STEEL CO., Albert St., Youngstown 1, Ohio
•UNITED STATES STEEL CO., Pittsburgh 30, Pa.

ROPE, Manila, Sisal, Jute, Etc.

WALL ROPE WORKS, INC., 48 South St., New York 5, N. Y.

ROPE, Wire (see Wire Rope)

RUBBER LININGS (see Chute Linings, Rubber)

S

SAFETY EQUIPMENT, Goggles, Shoes, Etc.

- AMERICAN OPTICAL CO., Southbridge, Mass.
•E. D. BULLARD CO., 275 Eighth St., San Francisco 3, Calif.
•EDMONT MANUFACTURING CO., 6th & Orange Sts., Coshocton, Ohio

GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntington Sts., Philadelphia 32, Pa.

•GOODALL RUBBER CO., Whitehead Road, Trenton 4, N. J.
•INDUSTRIAL PRODUCTS CO., 2705 N. Fourth St., Philadelphia 33, Pa.

•JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

•LEHIGH SAFETY SHOE CO., 31 S. 7th St., Allentown, Pa.

•MONTGOMERY & CO., INC., 53 Park Pl., New York 7, N. Y.

•UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

•WILLSON PRODUCTS, INC., 248 Washington St., Reading, Pa.

SAMPLING EQUIPMENT

- ACKER DRILL CO., INC., 725 W. Lackawanna Ave., Scranton 3, Pa.
•FULLER COMPANY, Fuller Bldg., Catonsville, Pa.
•THE GALIGHIER COMPANY, 545 W. 8th South, Salt Lake City, Utah
•HARDING CO., INC., 240 Arch St., York, Pa.
•HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.
•THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
•SPRAGUE & HENWOOD, INC., 221 W. Olive St., Scranton 2, Pa.
•STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

SAND DRAGS (see Sand Recovery Machinery)

SAND-LINE BRICK MACHINERY (see Brick Machinery)

SAND RECOVERY MACHINERY, Cones, Classifiers, Dewaterers, Drags, Etc.

- ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.
•ALLEN-SHERMAN-HOFF CO., Lewis Tower Bldg., Philadelphia 2, Pa.
•ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.
•ANDERSON ENGINEERING CO., 237 Bent St., Cambridge 41, Mass.
•ATLAS CORPORATION, Mountville, Pa.
•BIRD MACHINE CO., South Walpole, Mass.
•BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
•COLORADO IRON WORKS CO., 1624 17th St., Denver 2, Colo.
•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
•COYLE & ROTH, 3024 4th St., S. E., Minneapolis 14, Minn.
•THE DEISTER CONCENTRATOR CO., P. O. Box 1, Fort Wayne 1, Ind.
•DEISTER MACHINE CO., 1933 East Wayne St., Fort Wayne 4, Ind.
•DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.
•THE DORR CO., INC., Barry Place, Stamford, Conn.
•EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg., Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

GREENVILLE MFG. WORKS, Greenville, Ohio

HARDING CO., INC., 240 Arch St., York, Pa.

ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

KENNEDY VAN SAUM MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

GLIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.

MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.

MORSE BROS. MACHINERY CO., 2900 Brighton Blvd., Denver 1, Colo.

McLANAHAN AND STONE CORP., Hollidaysburg, Pa.

NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.

PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

SIMPLICITY ENGINEERING CO., Durand, Mich.

SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

WEBSTER MFG. INC., Tiffin 16, Ohio

WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

SANDERS, Cast Stone

INDEPENDENT PNEUMATIC TOOL CO., 175 N. State St., Chicago 6, Ill.

SCALES, Batching (see Batches)

SCALES, Conveyor (see Feeders)

SCALES, Hopper

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

BEAUMONT-BIRCH CO., 1505 Rose St., Philadelphia, Penna.

BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh 22, Penna.

BONDED SCALE CO., 2166 S. 3rd St., Columbus, Ohio

BUTLER BIN CO., Box 407, Waukesha, Wis.

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

THE CONVEYOR CO., 3260 E. Stauson Ave., Los Angeles 58, Calif.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

FLEMING MFG. CO., INC., 4985 Fyler Ave., St. Louis 9, Mo.

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.

THE HETZEL STEEL FORM & IRON CO., 1750 Thomas Rd., Warren, Ohio

THE HOWE SCALE CO., Rutland, Vt.

MEYER SCALES, INC., 449 Central Ave., Orange, N. J.

NOBLE CO., 1860 Seventh St., Oakland 20, Calif.

RICHARDSON SCALE CO., Van Houten Ave., Clifton, N. J.

SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N. J.

STREETER-AMET CO., 4101 N. Ravenswood, Chicago 13, Ill.

TOLEDO SCALE CO., 1090 Telegraph Road, Toledo 12, Ohio

THE WEBB CORP., 402 E. Broadway, Webb City, Mo.

WINSLOW GOVT. STANDARD SCALE WKS., INC., 25th and Haythorne Ave., Terre Haute, Ind.

THE YALE & TOWNE MFG. CO., Philadelphia 15, Pa.

SCALES, Laboratory

CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

FISHER SCIENTIFIC CO., 717 Forbes St., Pittsburgh 19, Pa.

GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntingdon Sts., Philadelphia 32, Pa.

THE HOWE SCALE CO., Rutland, Vt.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

TOLEDO SCALE CO., 1090 Telegraph Road, Toledo 12, Ohio

SCALES, Larry (see Weigh Larries)

SCALES, Proportioning (see Batches)

SCALES, Truck, Railway

BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.

THE HOWE SCALE CO., Rutland, Vt.

MEYER SCALES, INC., 449 Central Ave., Orange, N. J.

STREETER-AMET CO., 4101 N. Ravenswood, Chicago 13, Ill.

TOLEDO SCALE CO., 1090 Telegraph Road, Toledo 12, Ohio

THE WEBB CORP., 402 E. Broadway, Webb City, Mo.

WINSLOW GOVT. STANDARD SCALE WKS., INC., 25th and Haythorne Ave., Terre Haute, Ind.

THE YALE & TOWNE MFG. CO., Philadelphia 15, Pa.

SCRAPERS, Power Drag (see Cable Excavators)

SCRAPERS, Tractor

ALLIED STEEL PRODUCTS, INC., 7835 Broadway, Cleveland 5, Ohio

ALLIS-CHALMERS MFG. CO., TRACTOR DIVN., P.O. Box 512, Milwaukee 1, Wis.

BUCKRUS-ERIE CO., South Milwaukee, Wis.

CATERPILLAR TRACTOR CO., Peoria 8, Ill.

THE EUCLID ROAD MACHINERY CO., 1361 Chardon Road, Cleveland 17, Ohio

THE HEIL CO., 3000 W. Montana St., Milwaukee 1, Wis.

ISAACSON IRON WORKS, Box 3028, Seattle 14, Wash.

HENNEUSE ENGINEERING CO., Marion, Ohio

LAPLANT-CHOATE MFG. CO., INC., 2920 1st Ave. N. E., Cedar Rapids, Iowa

R. G. LeTOURNEAU, INC., 2301 N. Adams St., Peoria, Ill.

SHEPPARD DIESELS, Philadelphia St., Hanover, Pa.

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.

WOOLDRIDGE MANUFACTURING CO., Sunnyvale, Calif.

SCREEN CLOTH, Woven-Wire (see Wire Cloth)

SCREEN PLATE, Perforated

THE ABBEY-SCHERER CO., 304 Railroad St., El Monte, Calif.

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

THE CALIFORNIA WIRE CLOTH CORP., 1080 19th Ave., Oakland 6, Calif.

CHICAGO PERFORATING CO., 2445 W. 24th Pl., Chicago 8, Ill.

THE COLORADO FUEL & IRON CORP., P.O. Box 1920, Denver 1, Colo.

CROSS ENGINEERING CO., Dundaff St., P.O. Box 507, Carbondale, Pa.

EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

THE FROG, SWITCH & MFG. CO., Carlisle, Pa.

GRIENDLER CRESHER & PULVERIZER CO., 1920 N. Market St., St. Louis 6, Mo.

HARRINGTON & KING PERFORATING CO., 5655 Fillmore St., Chicago 44, Ill.

HENDRICK MFG. CO., Carbondale, Pa.

ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

IOWA MFG. CO., 916 16th St., N. E., Cedar Rapids, Iowa

KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

McNALLY PITTSBURGH MFG. CORP., Pittsburgh, Kans.

MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.

CHARLES MUNDT & SONS, 53 Fairmount Ave., Jersey City 4, N. J.

SIMPLICITY ENGINEERING CO., Durand, Mich.

SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.

STANDARD STAMPING & PERFORATING CO., 3131 W. 49th Place, Chicago 32, Ill.

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

YUBA MFG. CO., 351 Californio St., San Francisco 4, Calif.

SCREENING PLANTS, Portable (see Crushing and Screening Plants Portable)

SCREENS

1. Gravity
2. Grizzly
3. Laboratory
4. Reversing
5. Scrubber
6. Vibrating & Shaker
7. Gyrating

ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.

ALLEN CONE & MACHINERY CORP., 120 Broadway, New York 5, N. Y.

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

AUSTIN-WESTERN CO., Aurora, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio

CENTRAL SCIENTIFIC CO., 1700 Irving Park Rd., Chicago 13, Ill.

CHICAGO PERFORATING CO., 2445 W. 24th Pl., Chicago 8, Ill.

CHICAGO STEEL FOUNDRY CO., 3720 So. Kedzie Ave., Chicago 32, Ill.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connellsville, Pa.

THE CONVEYOR CO., 3260 East Stauson Ave., Los Angeles 11, Calif.

COYLE & ROTH, 3024 4th St. S. E., Minneapolis 14, Minn.

THE DEISTER CONCENTRATOR CO., P.O. Box 1, Fort Wayne 1, Ind.

DEISTER MACHINE CO., 1933 East Wayne St., Fort Wayne 4, Ind.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

DIAMOND IRON WORKS, INC., 1728 2nd St. No., Minneapolis 12, Minn.

THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

FISHER SCIENTIFIC CO., 717 Forbes St., Pittsburgh 19, Pa.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

GIFFORD-WOOD CO., 1 Hurdon Ave., Hudson, N. Y.

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DIRECTORY

•THE GILSON SCREEN CO., 119 E. Market St., Mercer, Pa.
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•GREENVILLE MFG. WORKS, Greenville, Ohio
4-5

•GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.
1-4-5-6

•GEORGE HAISS MFG. CO. INC., Park Ave. and 143rd St., New York 51, N. Y.
1-2-3

•HENDRICK MFG. CO., P.O. Box 497, Carbondale, Pa.
1-2-3-4-5-6-7

•ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
3-6

•ROBERT HOLMES & BROS. INC., 3519 Junction Ave., Danville, Ill.
2-3-6

•HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.
3

•IOWA MFG. CO., 916 16th St. N.E., Cedar Rapids, Iowa
1-2-4-5-6

•THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
6

•KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
1-2-4-5-6

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
1-2-4-5-6

•LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
1-2-4-5-6

•MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
1-2-4-5

•MILLVILLE IRON WORKS INC., 6th St. & Florence Ave., Millville, N. J.
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•MCCLANAHAN AND STONE CORP., Hollidaysburg, Pa.
2-4-5-6

•MCNALLY-PITTSBURGH MFG. CORP., Pittsburg, Kans.
1-2-4-6

•NORDBERG MFG. CO., 3073 So. Chase Ave., Milwaukee 7, Wis.
2-6-7

•OVERSTROM & SONS, 2213 W. Mission Road, Alhambra, Calif.
3-6

•THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio
7

•PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.
2-4-5-6

•PRASCHAK MACHINE CO., Marshfield, Wis.
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•PRODUCTIVE EQUIPMENT CORP., 2926 W. Lake St., Chicago 12, Ill.
2-3-6

•W. A. RIDDELL CORP., Bucyrus, Ohio
1-6

•JOHN A. ROEBLING'S SONS CO., 540 S. Broad St., Trenton 2, N. J.
4

•ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.
2-4-5-6

•ROSS SCREEN & FEEDER CO., 19 Rector St., New York 6, N. Y.
2

•SCREEN EQUIPMENT CO., INC., Buffalo 21, N. Y.
6

•SEPARATIONS ENGINEERING CORP., 110 E. 42nd St., New York 17, N. Y.
1-3-5-6

•SIMPLICITY ENGINEERING CO., Durand, Mich.
2-6

•SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
1-2-3-4-5-6

•STAR WIRE SCREEN & IRON WORKS, 2515 San Fernando Rd., Los Angeles 65, Calif.
1-2-3-4-5-6

•STEDMAN FOUNDRY & MACHINE CO., INC., Indiana Ave., Aurora, Ind.
3

•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
2-4-5-6

•STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
2-4-5-6

•STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.
3-6

•SYNTRON CO., 450 Lexington Ave., Homer City, Pa.
2-6

•TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
2

•TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.
2-4-5

•TRIANGLE ENGINEERING CO., 2848 W. 26th St., Chicago 23, Ill.
6

•THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio
1-2-3-5-6

•UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
1-2-4-6

•UNIVERSAL ENGINEERING CORP., 625 C Ave. N.W., Cedar Rapids, Iowa
4-5-6

•UNIVERSAL VIBRATING SCREEN CO., Deane Blvd. & St. Paul RR., Racine, Wis.
3-6

•VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside, L. I., N. Y.
4

•WEBSTER MFG. INC., Tiffin 16, Ohio
1-2-4

•WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.
6

•WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.
2-4-5-6

•YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
4

SCREW CONVEYORS (see Conveyors, Screw)

SCRUBBERS, Crushed Stone, Gravel

•ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
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•AUSTIN-WESTERN CO., Aurora, Ill.
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•BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
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•THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
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•COYLE & ROTH, 3024 4th St. S.E., Minneapolis 14, Wis.
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•THE DORR CO., INC., Barry Place, Stamford, Conn.
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•EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa
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•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
1

•GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.
1

•GREENVILLE MFG. WORKS, Greenville, Ohio
1

•GRUENDLER CRUSHER & PULVERIZER CO., 2920 N. Market St., St. Louis 6, Mo.
1

•HARDINGE CO., INC., 240 Arch St., York, Pa.
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•IOWA MFG. CO., 916 16th St. N.E., Cedar Rapids, Iowa
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•KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.
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•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
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•LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
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•MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
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•E. F. MARSH ENG. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
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•MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.
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•MCCLANAHAN AND STONE CORP., Hollidaysburg, Pa.
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•NICHOLS ENGINEERING & RESEARCH CORP., 70 Pine St., New York 5, N. Y.
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•PIONEER ENG. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.
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•ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.
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•SMITH ENGINEERING WORKS, 532 E. Capitol Dr., Milwaukee 12, Wis.
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•STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
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•STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
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•TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.
1

•UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
1

•UNIVERSAL ENGINEERING CORP., 625 C Ave. N.W., Cedar Rapids, Iowa
1

•WEBSTER MFG. INC., Tiffin 16, Ohio
1

•YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
1

SEAL RINGS, Kiln

•MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.
1

•F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.
1

SEPARATORS, Air (see Air Separators)

SEPARATORS, Electrostatic (see Classifiers)

SEPARATORS, Magnetic (see Magnetic Separators)

SHEAVES

1. Wire Rope
2. V. Belt

•ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.
1

•AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.
1

•BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.
1

•THE C. O. BARTLEY AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
1

•BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.
1

•BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.
1-2

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
1

•THE DAYTON RUBBER CO., Dayton 1, Ohio
2

•R. & J. DICK CO., INC., P. O. Box 388, Passaic, N. J.
1

•DOBBIE FOUNDRY & MACHINE CO., 146-170 Portage Road, Niagara Falls, N. Y.
1

•DODGE MANUFACTURING CORP., Mishawaka, Ind.
2

•DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.
6

•THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.
1

•ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
1

•FARRELL-CHEEK STEEL CO., Sandusky, Ohio
1

•THE FROG, SWITCH & MFG. CO., Carlisle, Pa.
1

•THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.
1

•HARDSOCC PNEUMATIC TOOL CO., 225 S. Benton St., Ottumwa, Iowa
2

•ROBERT HOLMES & BROS. INC., 3519 Junction Ave., Danville, Ill.
1

•W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Rd., Chicago 24, Ill.
1-2

•JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
1

•KENSINGTON STEEL CO., 505 Kensington St., Chicago 28, Ill.
1

•LINK-BELT CO., 300 W. Pershing Rd., Chicago 9, Ill.
1

•THE LOOMIS MACHINE CO., 15 E. Market St., Tiffin, Ohio
1

•LOVEJOY FLEXIBLE COUPLING CO., 5009 W. Lake St., Chicago 44, Ill.
1

•MESCO TACKLE BLOCK CO., P. O. Box 148, Easton, Pa.
1

•THE MEDART CO., 100 Potomac St., St. Louis 18, Mo.
1

•MCCLANAHAN AND STONE CORP., Hollidaysburg, Pa.
2

•MCNALLY-PITTSBURGH MFG. CORP., Pittsburg, Kans.
2

•NICE BALL BEARING CO., 20th and Hunting Park Ave., Philadelphia 40, Pa.
1

•PYOTT FOUNDRY & MACHINE CO., 328 No. Sangamon St., Chicago 7, Ill.
1-2

•SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill.
1

•TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
1

•UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
1-2

•VULCAN IRON WORKS, 700 So. Main St., Wilkes-Barre, Pa.
1

•WEBSTER MFG. INC., Tiffin 16, Ohio
1

•WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.
1

•YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
1-2

SHOVELS, Crawler Mounted

1. Diesel
2. Electric
3. Gasoline
4. Electric Generator

•AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.
1-2-3

•ATHEY PRODUCTS CORP., 5631 W. 65th St., Chicago 38, Ill.
1

•AUSTIN-WESTERN CO., Aurora, Ill.
1-2-3-4

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

BAY CITY SHOVELS, INC., Bay City, Mich.

THE BROWNING CRANE & SHOVEL CO., 16226 Waterloo Road, Cleveland 10, Ohio

BUCHYRUS-ERIE CO., South Milwaukee, Wis.

THE BYERS MACHINE CO., Lock Box 390, Ravenna, Ohio

DEMPSTER BROTHERS, INC., Springfield St., Knoxville 17, Tenn.

THE EIMCO CORP., P. O. Box 300, Salt Lake City 10, Utah

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio

HARNISCHFGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.

INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.

KEYSTONE DRILLER CO., 8th Ave., Beaver Falls, Pa.

KOEHRING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.

LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP., South Main St., Lima, Ohio

LINK-BELT SPEEDER CORP., 1201 Sixth St. S. W., Cedar Rapids, Iowa

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

MARION POWER SHOVEL CO., 617 W. Center St., Marion, Ohio

MICHIGAN POWER SHOVEL CO., 250 Miller Road, Benton Harbor, Mich.

NORTHWEST ENGINEERING CO., 135 S. LaSalle St., Chicago 3, Ill.

ORTON CRANE & SHOVEL CO., 608 S. Dearborn St., Chicago 5, Ill.

THE OSGOOD CO., Marion, Ohio

THE THEW SHOVEL CO., 1000 E. 28th St., Lorain, Ohio

TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.

UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14, Wis.

WAYNE CRANE DIV. AMERICAN STEEL DREDGE CO., INC., P. O. Box 570, Fort Wayne 1, Ind.

WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

SHOVELS, Tractor

ALLIS-CHALMERS MFG. CO., TRACTOR DIVN., P. O. Box 512, Milwaukee 1, Wis.

ATHEY PRODUCTS CO., 5631 W. 65th St., Chicago 38, Ill.

BUCHYRUS-ERIE CO., South Milwaukee, Wis.

DROTT MFG. CORP., 3841 W. Wisconsin Ave., Milwaukee 8, Wis.

THE EIMCO CORP., P. O. Box 300, Salt Lake City 10, Utah

THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.

INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.

LESSMANN MANUFACTURING CO., E. 20th & Easton Blvd., Des Moines 4, Iowa

LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP., South Main St., Lima, Ohio

LINK-BELT SPEEDER CORP., 1201 Sixth St. S. W., Cedar Rapids, Iowa

LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.

MAINE STEEL INC., South Windham, Me.

MANDT MFG. CO., 490 W. Goodale St., Columbus 8, Ohio

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

THE OLIVER CORP., INDUSTRIAL DIV., 19300 Euclid Ave., Cleveland 17, Ohio

OTTAWA STEEL PRODUCTS CO., Ottawa, Kansas

SHEPPARD DIESELS, Philadelphia 31, Pa.

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Nimitz, Calif.

TRACKSON COMPANY, 3333 S. Chase Ave., Milwaukee 7, Wis.

TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.

BUCHYRUS-ERIE CO., South Milwaukee, Wis.

THE BYERS MACHINE CO., Lock Box 390, Ravenna, Ohio

THE EIMCO CORP., P. O. Box 300, Salt Lake City 10, Utah

THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio

HARNISCHFGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.

INSLEY MFG. CORP., 801 N. Olney, Indianapolis 1, Ind.

KOEHRING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.

LIMA SHOVEL & CRANE DIV. OF BALDWIN-LIMA-HAMILTON CORP., South Main St., Lima, Ohio

LINK-BELT SPEEDER CORP., 1201 Sixth St. S. W., Cedar Rapids, Iowa

MICHIGAN POWER SHOVEL CO., 250 Miller Road, Benton Harbor, Mich.

NORTHWEST ENGINEERING CO., 135 S. LaSalle St., Chicago 3, Ill.

ORTON CRANE & SHOVEL CO., 608 S. Dearborn St., Chicago 5, Ill.

THE OSGOOD CO., Marion, Ohio

"QUICK-WAY" TRUCK SHOVEL, 2401 E. 40th Ave., Denver 5, Colo.

SCHILD BANTAM CO., 216 Park St., Waverly, Iowa

THE THEW SHOVEL CO., 1000 E. 28th St., Lorain, Ohio

UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14, Wis.

WAYNE CRANE DIV. AMERICAN STEEL DREDGE CO., INC., P. O. Box 570, Fort Wayne 1, Ind.

WESTERN MACHINERY CO., 760-766 Folsom St., San Francisco 7, Calif.

SHREDDERS, Plaster

ABBE ENGINEERING CO., 50 Church St., New York 7, N. Y.

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

WILLIAMS PATENT CRUSHER & PULV. CO., 2701 N. Broadway, St. Louis 6, Mo.

SIEVES, Testing

FISHER SCIENTIFIC CO., 717 Forbes St., Pittsburgh 19, Pa.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

STURTEVANT MILL CO., 102 Clayton St., Boston 22, Mass.

THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio

SILOS, Storage

BEAUMONT-BIRCH CO., 1503 Race St., Philadelphia 2, Pa.

BETHLEHEM STEEL CO., E. 3rd St., Bethlehem, Penna.

BIRMINGHAM TANK CO., DIV. OF INGALLS IRON WORKS CO., P. O. Drawer 1490, Birmingham 1, Ala.

THE BONNOT CO., 722 Mulberry S.E., Canton 2, Ohio

CONCRETE SILO CO., P. O. Box 346, Bloomfield, Ind.

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

THE DODSON MFG. CO., 1463 Barwise Ave., Wichita 2, Kans.

ERIE STEEL CONST. CO., Geist Rd. and N.P.R.R., Erie, Penna.

GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.

E. LEE HEIDENREICH, JR., 67 Second St., Newburgh, N. Y.

THE HETZEL STEEL FORM & IRON CO., 1750 Thomas Rd., Warren, Ohio

THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.

LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

THE MARIETTA CONCRETE CORP., Westview, Box 356, Marietta, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

NICHOLSON CO., 10 Rockefeller Plaza, New York 20, N. Y.

SINTERING MACHINERY

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

BESSER MFG. CO., 205 47th St., Alpena, Mich.

KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N. Y.

THE MARIETTA CONCRETE CORP., Westview, Box 356, Marietta, Ohio

SINTERING MACHINERY CORP., Netcong, N. J.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

SKIP LOADERS

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

THE E. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BEAUMONT-BIRCH CO., 1503 Race St., Philadelphia, Penna.

BESSER MFG. CO., Alpena, Mich.

CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P. O. Box 673, Connelville, Pa.

CONSTRUCTION PRODUCTS CORP., 410 San Fernando Road, Los Angeles 31, Calif.

DEMPSTER BROTHERS, INC., Springfield St., Knoxville 17, Tenn.

DES PLAINES CONCRETE PROD. MACHINERY, 930 North Ave., Des Plaines, Ill.

DODSON MFG. CO., INC., 1463 Barwise Ave., Wichita 2, Kans.

DROTT MFG. CORP., 3841 W. Wisconsin Ave., Milwaukee 8, Wis.

GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.

ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.

LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.

LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.

MULTIPLEX MACHINERY CORP., Elmore, Ohio

THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

ROGERS IRON WORKS CO., Joplin, Mo.

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.

STEARNS MFG. CO., INC., 600 E. Beecher St., Adrian, Mich.

WEBSTER MFG. INC., Tiffin 16, Ohio

WITTEMAN MACHINERY CO., Painters Road, Farmingdale, N. Y.

SKIP HOISTS

ALLIS-CHALMERS MFG. CO., Milwaukee 1, Wis.

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

THE E. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BEAUMONT-BIRCH CO., 1503 Race St., Philadelphia, Penna.

BESSER MFG. CO., Alpena, Mich.

CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P. O. Box 673, Connelville, Pa.

DEMPSTER BROTHERS, INC., Springfield St., Knoxville 17, Tenn.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

DODSON MFG. CO., INC., 1463 Barwise Ave., Wichita 2, Kans.

THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

FLEMING MFG. CO., 4985 Fyler Ave., St. Louis 9, Mo.

GALENA MACHINE & ELECTRIC CO., 209-11 Main St., Galena, Kans.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.

GREENVILLE MFG. WORKS, Greenville, Ohio

ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.

HYDRO-FORGED STONE ASSOCIATES, INC., 470 Buckley Bldg., Cleveland 15, Ohio

INGERSOLL-RAND CO., 11 Broadway, New York 4, N. Y.

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio

LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

• **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

• **MISHCO CORP.**, 615 SW 2nd Ave., Miami, Fla.

• **MULTIPLEX MACHINERY CORP.**, Elmora, Ohio

• **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 7, Wis.

• **THE GENE OLSEN CORP.**, 401 Grace St., Adrian, Mich.

• **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.

• **SOUTHEAST STEEL SALES CO.**, 437 N. Garland St., Orlando, Fla.

• **STEARNS MFG. CO., INC.**, 600 E. Beecher St., Adrian, Mich.

• **STEARNS-ROGERS MFG. CO.**, 1720 California St., Denver 2, Colo.

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

• **SUPERIOR LIDDERWOOD-MUNDY CORP.**, 7 Day St., New York 7, N. Y.

• **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.

• **UNIVERSAL TAMPERS INC.**, 1530 N. Adams St., Peoria 3, Ill.

• **WEBSTER MFG. INC.**, Tiffin 16, Ohio

• **THE WILLMAN ENGINEERING CO.**, 7000 Central Ave., Cleveland 5, Ohio

SLAKERS (see Hydrators, Lime)

SLINGS, Wire Rope (see Wire Rope Slings)

SLUGS, Grinding (see Grinding Media)

SLURRY AGITATORS

• **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

• **THE DORR CO., INC.**, Barry Place, Stamford, Conn.

• **THE GALLIGHER COMPANY**, 545 W. 8th South, Salt Lake City, Utah

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.

• **MANITOWOC ENGINEERING WORKS**, Manitowoc, Wis.

• **MORSE BROS. MACHINERY CO.**, 2900 Brighton Blvd., Denver 1, Colo.

• **H. K. PORTER CO., INC.**, 49th & Harrison Sts., Pittsburgh 1, Pa.

• **W. A. RIDDELL CORP.**, Bucyrus, Ohio

• **F. L. SMIDTH & CO.**, 11 W. 42nd St., New York 18, N. Y.

• **THE T. L. SMITH CO.**, 2835 N. 32nd St., Milwaukee 45, Wis.

• **STRUTHERS WELLS CORP.**, Pennsylvania Ave., Warren, Pa.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

SLURRY FILTERS

• **BIRD MACHINE CO.**, South Walpole, Mass.

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

• **THE EIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah

• **FILTRATION ENGINEERS INC.**, 155 Oraton St., Newark 4, N. J.

• **MORSE BROS. MACHINERY CO.**, 2900 Brighton Blvd., Denver 1, Colo.

• **OLIVER UNITED FILTERS INC.**, 33 W. 42nd St., New York 18, N. Y.

SLURRY MIXERS

• **ABBE ENGINEERING CO.**, 50 Church St., New York 7, N. Y.

• **THE BONNOT CO.**, 722 Mulberry S.E., Canton 2, Ohio

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

• **THE DORR CO., INC.**, Barry Place, Stamford, Conn.

• **THE J. B. ENRSAM & SONS MFG. CO.**, Enterprise, Kans.

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.

• **KOENRING CO.**, 3026 W. Concordia Ave., Milwaukee 16, Wis.

• **KWIK-MIX CO.**, 235 W. Grand Ave., Port Washington, Wis.

• **F. L. SMIDTH & CO.**, 11 W. 42nd St., New York 18, N. Y.

• **STRUTHERS WELLS CORP.**, Pennsylvania Ave., Warren, Pa.

• **THE T. L. SMITH CO.**, 2835 N. 32nd St., Milwaukee 45, Wis.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

SLURRY PUMPS (see Pumps, Slurry)

SLURRY SEPARATORS

• **THE DORR CO., INC.**, Barry Pl., Stamford, Conn.

• **MERCO CENTRIFUGAL CO.**, 1045 Sansone St., San Francisco 11, Calif.

• **NICHOLS ENGINEERING & RESEARCH CORP.**, 70 Pine St., New York 5, N. Y.

• **F. L. SMIDTH & CO.**, 11 W. 42nd St., New York 18, N. Y.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

SLURRY THICKENERS

• **BIRD MACHINE CO.**, South Walpole, Mass.

• **CENTRIFUGE MECHANICAL EQPT., INC.**, 95 River St., Hoboken, N. J.

• **THE CONVEYOR CO.**, 3260 East Stauson Ave., Los Angeles 11, Calif.

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

• **THE DORR CO., INC.**, Barry Place, Stamford, Conn.

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

• **GENERAL AMERICAN TRANSPORTATION CORP.**, Field Bldg. Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.

• **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

• **MERCO CENTRIFUGAL CO.**, 1045 Sansone St., San Francisco 11, Calif.

• **MORSE BROS. MACHINERY CO.**, 2900 Brighton Blvd., Denver 1, Colo.

• **WESTERN MACHINERY CO.**, 760-766 Folsom St., San Francisco 7, Calif.

SOCKETS, Wire Rope (see Wire Rope Fittings)

SPEED REDUCERS (see Drives)

SPOUTS (see Chutes)

SPRAY COOLING SYSTEMS

• **BLOWER APPLICATION CO.**, 3165 N. 30th St., Milwaukee 10, Wis.

• **F. L. SMIDTH & CO.**, 11 W. 42nd St., New York 18, N. Y.

• **SPRAYING SYSTEM CO.**, 3201 Randolph St., Bellwood, Ill.

SPRAYS, Wash Water

• **THE DEISTER CONCENTRATOR CO.**, P. O. Box 1, Fort Wayne 1, Ind.

• **DEISTER MACHINE CO.**, 1933 East Wayne St., Fort Wayne 4, Ind.

• **SPRAYING SYSTEMS CO.**, 3201 Randolph St., Bellwood, Ill.

SPROCKETS, Chain

• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.

• **THE C. O. BARTLETT AND SHOW CO.**, 6200 Harvard Ave., Cleveland 5, Ohio

• **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.

• **CHAIN BELT CO.**, 1600 W. Bruce St., Milwaukee 4, Wis.

• **CONTINENTAL GIN CO.**, P. O. Box 2614, Birmingham, Ala.

• **THE CONVEYOR CO.**, 3260 East Stauson Ave., Los Angeles 11, Calif.

• **DIAMOND CHAIN CO., INC.**, 402 Kentucky Ave., Indianapolis 7, Ind.

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

• **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.

• **IOWA MFG. CO.**, 916 16th St. N.E., Cedar Rapids, Iowa

• **THE JEFFREY MFG. CO.**, 935 N. 4th St., Columbus 16, Ohio

• **KENSINGTON STEEL CO.**, 505 Kensington St., Chicago 28, Ill.

• **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.

• **MORSE CHAIN CO.**, 7601 Central Ave., Detroit 8, Mich.

• **MCCALL-PITTSBURG MFG. CORP.**, Pittsburg, Kans.

• **PYOTT FOUNDRY & MACHINE CO.**, 328 No. Sangamon St., Chicago 7, Ill.

• **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.

• **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.

• **WEBSTER MFG. INC.**, Tiffin 16, Ohio

STAIR TREADS & STEPS, Industrial

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P. O. Box 1198, Pittsburg 30, Pa.

• **GOODALL RUBBER CO.**, Whitehead Road, Trenton 4, N. J.

• **HENDERICK MFG. CO.**, Carbondale, Pa.

• **THE KIRK & BLUM MFG. CO.**, 2838 Spring Grove Ave., Cincinnati 25, Ohio

• **LUKENS STEEL CO.**, 521 Lukens Bldg., Coatesville, Pa.

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N. Y.

STARTERS, Motor

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

• **B. F. M. INDUSTRIES, INC.**, 2124 Mill Ave., Brooklyn 34, N. Y.

• **THE ELECTRIC CONTROLLER & MFG. CO.**, 2700 E. 79th St., Cleveland 4, Ohio

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

• **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

STEAM-CURING EQUIPMENT, Concrete (see Kilns)

STEEL

1. Abrasion Resisting
2. Bar
3. Concrete Reinforcing
4. Heat-Resisting
5. Manganese
6. Plates & Shapes
7. Shafting
8. Special Alloy

• **ALLIED STEEL PRODUCTS, INC.**, 7835 Broadway, Cleveland 5, Ohio

1-2-5-6-7-8
• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 377 E. 14th St., Chicago Heights, Ill.

1-2-3-4-5-6-7-8
• **AMERICAN STEEL & WIRE CO.**, Rockefeller Bldg., Cleveland 13, Ohio

• **AUTOMATIC SPRING COILING CO.**, 4051 W. Thorndale Ave., Chicago, Ill.

3
• **BAER STEEL PRODUCTS, INC.**, P. O. Box 497, Auburn, Wash.

5-6-7-8
• **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.

1-2-3-4-5-6-7-8
• **CAPE ANN ANCHOR & FORGE CO.**, Whittemore St., Gloucester, Mass.

7
• **CHICAGO STEEL FOUNDRY CO.**, 3720 So. Kedzie Ave., Chicago 32, Ill.

4
• **THE COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.

2-3-5
• **ELECTRIC STEEL FOUNDRY CO.**, 2141 N. W. 25th Ave., Portland 10, Ore.

1-2-3-5
• **ELECTRO-ALLOYS DIV., AMERICAN BRAKE SHOE CO.**, Taylor St. & Abbey Road, Elyria, Ohio

1-4-8
• **THE FAHRALLOY CO.**, 149th Loomis St., Harvey, Ill.

4-8
• **FARRELL-CHEEK STEEL CO.**, Sandusky, Ohio

1
• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

1-5
• **GENERAL CONVEYOR & MFG. CO.**, 3601 Salena St., St. Louis 18, Mo.

1-2-3-4-5-6-7-8
• **HAMMERMILLS, INC. DIV. OF PETTIBONE MULLIKEN CORP.**, 4710 W. Division St., Chicago 51, Ill.

5
• **ISAACSON IRON WORKS**, Box 3028, Seattle 14, Wash.

1-2-3-4-5-6-7-8
• **JONES & LAUGHLIN STEEL CORP.**, Third Ave. & Ross St., Pittsburgh 30, Pa.

1-2-3-6-7-8
• **KENSINGTON STEEL CO.**, 505 Kensington St., Chicago 28, Ill.

5
• **LACLEDE STEEL CO.**, Arcade Bldg., St. Louis 1, Mo.

2-3
• **LUKENS STEEL CO.**, 521 Lukens Bldg., Coatesville, Pa.

1-4-5-6-8

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.
1-5-8

REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio
1-2-3-4-5-6-7-8

JOSEPH T. RYERSON & SON, INC., 2558 West 16th St., Chicago 80, Ill.
1-2-3-4-5-6-7-8

STROH PROCESS STEEL CO., 1428 High St., Pittsburgh 12, Pa.
1

STULZ-SICKLES CO., 134 Lafayette St., Newark 5, N. J.
1-2-5-6

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
1-5-8

THE TIMKEN ROLLER BEARING CO., 1835 Duerbe Ave. S.W., Canton 6, Ohio
1-2-3-4-5-8

TRUSCOM STEEL CO., Albert St., Youngstown 1, Ohio
1

UNITED STATES STEEL CO., Pittsburgh 30, Pa.
1-2-3-4-5-6-7-8

YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
1-2-5-6-7-8

STOKERS, Coal, for Lime Kilns, Etc.

ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC., 958 Wall St., Toledo 6, Ohio

THE BABCOCK & WILCOX CO., 85 Liberty St., New York 6, N. Y.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S.E., Minneapolis 14, Wis.

FAIRBANKS, MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

SUPERIOR - LIDGERWOOD - MUNDY CORP., 7 Day St., New York 7, N. Y.

STORAGE SYSTEMS, Radial

GEORGE HAISS MFG. CO. INC., Park Ave. and 143rd St., New York 51, N. Y.

ROBINS CONVEYORS DIV. HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

THE MARIETTA CONCRETE CORP., Westview, Box 356, Marietta, Ohio

THE HEFF & FRY CO., 150 S. Main St., Camden, Ohio

SAUERMAN BROS., INC., 530 S. Clinton St., Chicago 7, Ill.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STUCCO COLORS (see Cement and Masonry Colors)

SUPERHEATERS (see Boilers)

SWITCHBOARDS AND PANELS

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

ALBERT & J. M. ANDERSON MFG. CO., 289-305 A St., Boston 10, Mass.

CONSOLIDATED DIESEL ELEC. CORP., Ludlow and Canal Sts., Stamford, Conn.

ELECTRIC MACHINERY MFG. CO., 1331 Tyler St. N.E., Minneapolis 14, Minn.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

I-T-E CIRCUIT BREAKER CO., 19th and Hamilton St., Philadelphia 30, Pa.

INTERNATIONAL DIESEL ELECTRIC CO., INC., 13-02 44th Ave., Long Island City 1, N. Y.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

SWITCHES, Control, Electric

ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wis.

ALBERT & J. M. ANDERSON MFG. CO., 289-305 A St., Boston 10, Mass.

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

I-T-E CIRCUIT BREAKER CO., 19th and Hamilton St., Philadelphia 30, Pa.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

SWITCHES, Magnetic

B. F. M. INDUSTRIES, INC., 2124 Mill Ave., Brooklyn 34, N. Y.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

STEARNS MAGNETIC MFG. CO., 675 S. 28th St., Milwaukee 46, Wis.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

T

TABLES, Washing, Concentrating (see Concentrating Tables)

TACHOMETERS, Counters, Etc.

THE BRISTOL CO., Waterbury 20, Conn.

GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

MANNING, MAXWELL & MOORE, INC., 11 Elias St., Bridgeport 2, Conn.

MONTGOMERY & CO., INC., 53 Park Pl., New York 7, N. Y.

RELIANCE ELECTRIC & ENGINEERING CO., 1088 Ivanhoe Rd., Cleveland 10, Ohio

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

TANKS, Gasoline

BIRMINGHAM TANK CO., DIV. OF INGALLS IRON WKS. CO., P. O. Drawer 1490, Birmingham 1, Ala.

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg. Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

GRAVER TANK & MFG. CO., INC., 4809 Tod Ave., East Chicago, Ind.

THE HEIL CO., 3000 W. Montana St., Milwaukee 1, Wis.

THE INGALLS IRON WORKS CO., P. O. Drawer 2632, Birmingham 2, Ala.

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.

TANKS, Sand Settling (see Sand Recovery Machinery)

TANKS, Storage, Concrete

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

CONCRETE FORMS CORP., 20 Vesey St., New York 7, N. Y.

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

DENVER EQUIPMENT CO., 1410 Seventeenth St., Denver 17, Colo.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

E. LEE HEIDENREICH, JR., 67 Second St., Newburgh, N. Y.

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

THE MARIETTA CONCRETE CORP., Westview, Box 356, Marietta, Ohio

THE HEFF & FRY CO., 150 S. Main St., Camden, Ohio

TANKS, Storage, Steel

ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC., 958 Wall St., Toledo 6, Ohio

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

BIRMINGHAM TANK CO., DIV. OF INGALLS IRON WKS. CO., P. O. Drawer 1490, Birmingham 1, Ala.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

BUTLER BIN CO., Box 407, Waukesha, Wis.

CONCRETE FORMS CORP., 20 Vesey St., New York 7, N. Y.

THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.

GENERAL AMERICAN TRANSPORTATION CORP., Field Bldg. Room 3105, 135 So. LaSalle St., Chicago 90, Ill.

GENERAL CONVEYOR & MFG. CO., 3601 Salena St., St. Louis 18, Mo.

GRAVER TANK & MFG. CO., INC., 4809 Tod Ave., East Chicago, Ind.

THE HETZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio

THE INGALLS IRON WORKS CO., P. O. Drawer 2632, Birmingham 2, Ala.

IRVINGTON FORM & TANK CORP., 20 Vesey St., New York 7, N. Y.

THE C. S. JOHNSON CO., P. O. Box 71, Champaign, Ill.

THE KIRK & BLUM MFG. CO., 2838 Spring Grove Ave., Cincinnati 25, Ohio

LANDIS STEEL CO., 116 W. A St., Picher, Okla.

LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

SIMPLICITY SYSTEM CO., Riverside Dr., Chattanooga 6, Tenn.

SOUTHWEST WELDING & MFG. CO., 3201 W. Mission Road, Alhambra, Calif.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S.E., Minneapolis 14, Minn.

TESTING LABORATORIES (see Laboratories)

TESTING EQUIPMENT (see Laboratory Apparatus)

THAWING PITS (For Frozen R. R. Hopper Cars)

HAUCK MFG. CO., 124-136 Tenth St., Brooklyn 15, N. Y.

THERMOCOUPLES, Pyrometers (see Pyrometers)

THICKENERS (see Slurry Thickeners)

THIRD AXLES (see Motor Truck Drives & Differentials)

TIRES, Coolers, Dryers, Kiln

THE FIRESTONE TIRE & RUBBER CO., 1203 Firestone Pkwy., Akron 17, Ohio

THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

HARDING CO., INC., 240 Arch St., York, Pa.

JAMES C. HEINTZ & CO., INC., W. 143rd at Lorain Ave., Cleveland 11, Ohio

LUKENS STEEL CO., 521 Lukens Bldg., Coatesville, Pa.

F. L. SMITH & CO., 11 W. 42nd St., New York 18, N. Y.

TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.

TIRES AND TUBES, Rubber, Heavy Duty Industrial

THE DAYTON RUBBER CO., Dayton 1, Ohio

THE FIRESTONE TIRE & RUBBER CO., 1200 Firestone Pkwy., Akron 17, Ohio

THE GATES RUBBER CO., 999 S. Broadway, Denver 17, Colo.

THE GENERAL TIRE & RUBBER CO., 1708 Englewood Ave., Akron 9, Ohio

B. F. GOODRICH CO., Akron 11, Ohio

THE GOODYEAR TIRE AND RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

SEIBERLING RUBBER CO., Akron 9, Ohio

UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

TORCHES, Cutting and Welding (see Welding & Cutting Equipment, Oxyacetylene)

TOWERS, Structural Steel

- **ALLIS - CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
- **THE INGALLS IRON WORKS CO.**, P. O. Drawer 2632, Birmingham 2, Ala.
- **MCKEUM ENGINEERING, INC.**, Dayton Rd., Ottawa, Ill.
- **MIXERMOBILE MANUFACTURERS**, 6855 N. E. Halsey St., P. O. Box 5108, Portland 16, Ore.
- **MCCALLY-PITTSBURGH MFG. CORP.**, Pittsburgh, Kans.

TRACK & TRACK EQUIPMENT

- **ALLIED STEEL PRODUCTS, INC.**, 7835 Broadway, Cleveland 5, Ohio
- **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- **BIRMINGHAM RAIL & LOCOMOTIVE CO.**, P.O. Box 391, Birmingham 1, Ala.
- **THE BUDA COMPANY**, 154th & Commercial, Harvey, Ill.
- **L. B. FOSTER CO.**, P. O. Box 1647, Pittsburgh 30, Pa.
- **MIDWEST STEEL CORP.**, Charleston 2, W. Va.
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 7, Wis.
- **PRESSED STEEL CAR CO., INC.**, 25 Broad St., New York 4, N. Y.
- **JOSEPH T. RYERSON & SON, INC.**, 2558 West 16th St., Chicago 80, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.
- **UNITED STATES STEEL CO.**, Pittsburgh 30, Pa.

TRACTORS, Industrial Crawler

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION**, P. O. Box 512, Milwaukee 1, Wis.
- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
- **MENHEUSE ENGINEERING CO.**, Marion, Ohio
- **THE FRANK G. HOUGH CO.**, Sunnyside Ave., Libertyville, Ill.
- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
- **LEWIS-SHEPARD PRODUCTS INC.**, 206 Walnut St., Watertown 72, Mass.
- **LULL MFG. CO.**, 3612 E. 44th St., Minneapolis 6, Minn.
- **M-R-S MANUFACTURING CO.**, P. O. Box 336, Flora, Miss.
- **THE OLIVER CORP., INDUSTRIAL DIV.**, 19300 Euclid Ave., Cleveland 17, Ohio
- **SILENT HOIST & CRANE CO.**, 841 63rd St., Brooklyn 20, N. Y.
- **WESTERN MACHINERY CO.**, 160-766 Folsom St., San Francisco 7, Calif.

TRAILER BODIES (see Bodies)

TRAILER BODIES, Bulk Cement (see Bodies)

TRAILERS & SEMI-TRAILERS, Motor Truck

- **ALLIED WELDING & MFG. CO., INC.**, 49 Lorna Doone Blvd., Orlando, Fla.
- **ATHEY PRODUCTS CO.**, 5631 W. 65th St., Chicago 38, Ill.
- **DART TRUCK CO.**, Oak at 27th Sts., Kansas City 8, Mo.
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
- **THE EUCLID ROAD MACHINERY CO.**, 1361 Chardon Road, Cleveland 17, Ohio
- **FORD MOTOR CO.**, Administration Bldg., Dearborn, Mich.
- **FRIEDHAUF TRAILER CO.**, Detroit 32, Mich.
- **THE HANSON CLUTCH & MACHINERY CO.**, Wall & Miami Sts., Tiffin 15, Ohio
- **M-R-S MANUFACTURING CO.**, P. O. Box 336, Flora, Miss.
- **MCCABE-POWERS AUTO BODY CO.**, 5900 N. Broadway, St. Louis 15, Mo.
- **THE TRAILMOBILE CO.**, 31st and Robertson Aves., Cincinnati 19, Ohio
- **UNITED IRON WORKS CO.**, 108 No. Locust, Pittsburg, Kans.
- **WINCH-LIFT INC.**, 317 First National Bank, Shreveport, La.

TRAMWAYS, Aerial (see Aerial Tramways)

TRANSFER PLANTS, Ready-Mixed Concrete

- **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **THE HELTZEL STEEL FORM & IRON CO.**, 1750 Thomas Rd., Warren, Ohio
- **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

TRANSFORMERS, Electric

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **I-T-E CIRCUIT BREAKER CO.**, 191th and Hamilton St., Philadelphia 30, Pa.
- **WAGNER ELECTRIC CORP.**, 6400 Plymouth Ave., St. Louis 14, Mo.
- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.

TRANSIT CONCRETE MIXING PLANTS (see Central Mixing Plants)

TRANSMISSION MACHINERY (see Gears)

TRIPPERS, Belt (see Conveyor Belt Trippers)

TROLLEYS, I-Beam

- **CHISHOLM-MOORE HOIST CORP.**, Fremont Ave., Tonawanda, N. Y.
- **CURTIS PNEUMATIC MACHINERY CO.**, 1988 Kienlen Ave., St. Louis 20, Mo.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **LINK-BELT CO.**, 300 W. Pershing Road, Chicago 9, Ill.
- **WHITING CORP.**, 15693 Lathrop Ave., Harvey, Ill.
- **THE YALE & TOWNE MFG. CO.**, Philadelphia 15, Pa.

TRUCK BODIES (see Bodies)

TRUCKS, Dump (see Motor Trucks)

TRUCKS, Hand

- **THE AMERICAN PULLEY CO.**, 4200 Wissachcon Ave., Philadelphia 29, Penna.
- **BARRET-CRAVENS CO.**, 4613 S. Western Blvd., Chicago 9, Ill.
- **THE CHASE FOUNDRY & MFG. CO.**, 2300 S. Parsons Ave., Columbus 7, Ohio
- **THE HOWE SCALE CO.**, Rutland, Vt.
- **LEWIS-SHEPARD PRODUCTS INC.**, 206 Walnut St., Watertown 72, Mass.
- **LIFT TRUCKS, INC.**, 2425 Spring Grove Ave., Cincinnati 14, Ohio
- **REVOLVATOR CO.**, 86th St. at U. S. Rts. 1 and 9, North Bergen, N. J.
- **SERVICE CASTER & TRUCK CORP.**, 500 N. Brownwood Ave., Albion, Mich.

TRUCKS, Lift (see Lift Trucks)

TRUCKS & TRACTORS, Wheeled Industrial

1. Electric
 2. Gas
- **ALLIS - CHALMERS MFG. CO., TRACTOR DIVN.**, P.O. Box 512, Milwaukee 1, Wis.
 - 1—2
 - **AUTOMATIC TRANSPORTATION CO.**, 101 W. 87th St., Chicago 20, Ill.
 - 1
 - **BAKER INDUSTRIAL TRUCK DIV., THE BAKER-RAULANG CO.**, 1250 W. 80th St., Cleveland 2, Ohio
 - 1
 - **BARRET-CRAVENS CO.**, 4613 S. Western Blvd., Chicago 9, Ill.
 - 1
 - **THE BUDA COMPANY**, 154th & Commercial, Harvey, Ill.
 - 2
 - **J. I. CASE CO.**, 700 State St., Racine, Wis.
 - 2
 - **CLARK EQUIPMENT CO., INDUSTRIAL TRUCK DIV.**, Springfield Pl., Battle Creek, Mich.
 - 1—2
 - **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
 - 1
 - **THE ELWELL-PARKER ELEC. CO.**, 4205 St. Clair Ave., Cleveland 8, Ohio
 - 1—2
 - **GAR-BRO MFG. CO.**, 2416 E. 16th St., Los Angeles 21, Calif.
 - 2

• **THE FRANK G. HOUGH CO.**, Sunnyside Ave., Libertyville, Ill.

2
• **HYSTER CO.**, 2902 N. E. Clackamas, Portland 8, Ore.

2
• **THE KNICKERBOCKER CO.**, 603 Liberty St., Jackson, Mich.

2
• **R. G. LeTOURNEAU, INC.**, 2301 N. Adams St., Peoria, Ill.

2
• **LEWIS-SHEPARD PRODUCTS INC.**, 206 Walnut St., Watertown 72, Mass.

1—2
• **LIFT TRUCKS, INC.**, 2425 Spring Grove Ave., Cincinnati 14, Ohio

1
• **LULL MFG. CO.**, 3612 E. 44th St., Minneapolis 6, Minn.

2
• **MINNEAPOLIS-MOLINE CO.**, P. O. Box 1050, Minneapolis 1, Minn.

2
• **THE OLIVER CORP., INDUSTRIAL DIV.**, 19300 Euclid Ave., Cleveland 17, Ohio

2
• **THE PRIME-MOVER CO.**, Muscatine, Iowa

2
• **REVOLVATOR CO.**, 86th St. at U. S. Rts. 1 and 9, North Bergen, N. J.

1—2
• **SERVICE CASTER & TRUCK CORP.**, 500 N. Brownwood Ave., Albion, Mich.

2
• **SHEPARD DIESELS**, Philadelphia St., Hanover, Pa.

2
• **SILENT HOIST & CRANE CO.**, 841 63rd St., Brooklyn 20, N. Y.

2
• **THE YALE & TOWNE MFG. CO.**, Philadelphia 15, Pa.

1—2

TRUCKS, Motor (see Motor Trucks)

TURBINES, Steam

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **COPPUS ENGINEERING CORP.**, 344 Park Ave., Worcester 2, Mass.
- **DE LAVAL STEAM TURBINE CO.**, Trenton 2, N. J.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
- **WESTINGHOUSE ELECTRIC CO.**, First Nat'l Bank Bldg., Pittsburgh, Pa.
- **WORTHINGTON PUMP & MACHINERY CORP.**, Worthington Ave., Harrison, N. J.

TURBINES, Water

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **THE BALDWIN LOCOMOTIVE WORKS**, Philadelphia 42, Pa.
- **DE LAVAL STEAM TURBINE CO.**, Trenton 2, N. J.

TURNTABLES, Track

- **BETHLEHEM STEEL CO.**, E. Third St., Bethlehem, Pa.
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
- **HARDING CO., INC.**, 240 Arch St., York, Pa.
- **PRESSED STEEL CAR CO., INC.**, 25 Broad St., New York 4, N. Y.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

REVOLVATOR CO., 86th St. at U. S. Rts. 1 and 9, North Bergen, N. J.
UNITED IRON WORKS CO., 108 No. Locust, Pittsburg, Kans.
VAN ORNUM CO., 344 Haddon Ave., Westmont, N. J.
WHITING CORP., 15693 Lathrop Ave., Harvey, Ill.

U

UNLOADERS, Boat

THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.
THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah
GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.
ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.
LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.
MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.
McKIERNAH-TERRY CORP., 505 Manor Ave., Harrison, N. J.
STEARNS MAGNETIC MFG. CO., 675 S. 28th St., Milwaukee 46, Wis.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
TRACKSON COMPANY, 3333 S. Chase Ave., Milwaukee 7, Wis.
THE WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 5, Ohio

UNLOADERS, Box Car

BONDED SCALE & MACHINE CO., 41 Bellview Ave., Columbus 7, Ohio
THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.
BUTLER BIN CO., Box 407, Waukesha, Wis.
THE CONVEYOR CO., 3260 East Slauson Ave., Los Angeles 11, Calif.
THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah
GEORGE HAISS MFG. CO., Park Ave. & 143rd St., New York 51, N. Y.
THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio
THE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.
HYSTER CO., 2918 N.E. Clockmas, Portland 8, Ore.
THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio
THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
MANDT MFG. CO., 490 W. Goodale St., Columbus 8, Ohio
JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
THE KENT MACHINE CO., 1931 Thomas St., Cuyahoga Falls, Ohio
LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.
LULL MFG. CO., 3612 E. 44th St., Minneapolis 6, Minn.
PETITBONE MULLIKEN CORP., 4710 W. Division St., Chicago 51, Ill.
SPROUT, WALDRON & CO., INC., Muncy, Pa.

STEARNS MAGNETIC MFG. CO., 675 S. 28th St., Milwaukee 46, Wis.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.
TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.
TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N. J.
WEBSTER MFG. INC., Tiffin 16, Ohio

UNLOADERS, Pneumatic

BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.
THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.
R. CONRADER CO., 1209 French St., Erie, Pa.
FULLER COMPANY, Fuller Bldg., Catsaqua, Pa.

UNLOADERS, Hopper Car

BARBER-GREENE CO., 631 W. Park Ave., Aurora, Ill.
BAUGHMAN MFG. CO., INC., Jerseyville, Ill.
THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.
CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.
GEORGE HAISS MFG. CO., INC., Park Ave. and 143rd St., New York 51, N. Y.
THE HELTZEL STEEL FORM & IRON CO., 1750 Thomas Rd., Warren, Ohio
ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.
THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
LITPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.
NATIONAL CONVEYOR & SUPPLY CO., 350 N. Harding Ave., Chicago 24, Ill.
NORTHERN CONVEYOR CO., 327 W. State St., Janesville, Wis.
SPROUT, WALDRON CO., INC., Muncy, Pa.
WEBSTER MFG. INC., Tiffin 16, Ohio

V

VACUUM CLEANING SYSTEMS

THE BRADY CONVEYORS CORP., 20 W. Jackson Blvd., Chicago 4, Ill.
JAMES H. MARKLEY, 80 Snyder Road, Ramsey, N. J.
THE SPENCER TURBINE CO., 486 New Park Ave., Hartford 6, Conn.

VALVES, Air

BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.
THE CLEVELAND VIBRATOR CO., 2828 Clinton Ave., Cleveland 13, Ohio
R. CONRADER CO., 1209 French St., Erie, Pa.
CURTIS PNEUMATIC MACHINERY CO., 1988 Kienlen Ave., St. Louis 20, Mo.

DIXON VALVE & COUPLING CO., Hancock & Columbia Ave., Philadelphia 2, Pa.
THE FOXBORO CO., Neponset Ave., Foxboro, Mass.
HOMESTEAD VALVE MFG. CO., P.O. Box 348, Coraopolis, Pa.
KNOX MFG. CO., 226 W. Clinton Ave., Oaklyn, N. J.
LEDEN MFG. CO., 1600 S. San Pedro St., Los Angeles 15, Calif.
MANNING, MAXWELL & MOORE, INC., 11 Elias St., Bridgeport 2, Conn.
MINNEAPOLIS - HONEYWELL REGULATOR CO., BROWN INSTRUMENTS DIV., Wayne and Roberts Aves., Philadelphia 44, Pa.
R-PVC VALVE DIV. AMERICAN CHAIN & CABLE CO., INC., Reading, Pa.
WALWORTH CO., 60 East 42nd St., New York 17, N. Y.

VALVES, Automatic

AUTOMATIC LIQUID METER CO., 1372-1378 E. 15th St., Los Angeles 21, Calif.
THE BRISTOL CO., Waterbury 20, Conn.
R. CONRADER CO., 1209 French St., Erie, Pa.
THE CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
THE FOXBORO CO., Neponset Ave., Foxboro, Mass.
MAHR MFG. CO. DIV. DIAMOND IRON WKS., 1728 2nd St., No. Minneapolis 11, Minn.
THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
MINNEAPOLIS - HONEYWELL REGULATOR CO., BROWN INSTRUMENTS DIV., Wayne and Roberts Aves., Philadelphia 44, Pa.
STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

VALVES, Bin

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
BUTLER BIN CO., Box 407, Waukesha, Wis.
CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.
CLEVELAND VIBRATOR CO., 2828 Clinton Ave. W., Cleveland, Ohio
CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.
FULLER COMPANY, Fuller Bldg., Catsaqua, Pa.
GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.
HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.
ROBERT HOLMES & BROS. INC., 3519 Junct. on Ave., Danville, Ill.
THE C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
MECKUM ENGINEERING, INC., Dayton Rd., Ottawa, Ill.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

VALVES, Pulverized Material

BLOWER APPLICATION CO., 3165 N. 30th St., Milwaukee 10, Wis.
BUTLER BIN CO., Box 407, Waukesha, Wis.
FULLER COMPANY, Fuller Bldg., Catsaqua, Pa.

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.
HOMESTEAD VALVE MFG. CO., P.O. Box 348, Coraopolis, Pa.
THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

VALVES, Slurry

FULLER COMPANY, Fuller Bldg., Catsaqua, Pa.
HILLS-McCANNA CO., 2349 Nelson St., Chicago 18, Ill.
HOMESTEAD VALVE MFG. CO., P.O. Box 348, Coraopolis, Pa.
THE MINE & SMELTER SUPPLY CO., 1422 17th St., Denver 17, Colo.
SEPARATION PROCESS CO., Fuller Bldg., Catsaqua, Pa.
WALWORTH CO., 60 E. 42nd St., New York 17, N. Y.

VALVES, Water

THE CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.
THE FLORI PIPE CO., 601-29 E. Red Bud Ave., St. Louis 15, Mo.
HOMESTEAD VALVE MFG. CO., P.O. Box 348, Coraopolis, Pa.
HILLS-McCANNA CO., 2349 Nelson St., Chicago 18, Ill.
JACUZZI BROS. INC., 5327 Jacuzzi Ave., Richmond, Calif.
JENKINS BROTHERS, 80 White St., New York 13, N. Y.
KNOX MFG. CO., 226 W. Clinton Ave., Oaklyn, N. J.
LAPLANT-CHOATE MFG. CO., INC., 2920 1st Ave. N. E., Cedar Rapids, Iowa
MANNING, MAXWELL & MOORE, INC., 11 Elias St., Bridgeport 2, Conn.
McNALLY-PITTSBURG MFG. CORP., Pittsburg, Kans.
R-PVC VALVE DIV. AMERICAN CHAIN & CABLE CO., INC., Reading, Pa.
WALWORTH CO., 60 East 42nd St., New York 17, N. Y.
R. D. WOOD CO., 1017 Public Ledger Bldg., Philadelphia 5, Pa.
WORTHINGTON PUMP & MACHINERY CORP., Worthington Ave., Harrison, N. J.

VENTILATORS, Powered, Roof

C. L. AMMERMAN CO., 3719 Third St. N.E., Minneapolis 21, Minn.
THE SWARTWOUT CO., 18511 Euclid Ave., Cleveland 12, Ohio

VIBRATING SCREENS (see Screens, Vibrating)

VIBRATORS for Chutes, Bins, Etc.

BUTLER BIN CO., Box 407, Waukesha, Wis.
CAHNON VIBRATOR CO., 1111 Power Ave., Cleveland 14, Ohio
CHICAGO PERFORATING CO., 2445 W. 24th Pl., Chicago 8, Ill.
THE CLEVELAND VIBRATOR CO., 2828 Clinton Ave., Cleveland 13, Ohio

* A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

•CONTINENTAL GIN CO., P. O. Box 2614, Birmingham, Ala.
 COYLE & ROTH, 3024 4th St. S.E., Minneapolis 14, Minn.
 THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio

•NEW HAVEN VIBRATOR CO., 145 Chestnut St., New Haven 7, Conn.

•SPO INC., 7500 Grand Division Ave., Cleveland 25, Ohio

•SYNTRON CO., 450 Lexington Ave., Homer City, Pa.

THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio

VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside, L. I., N. Y.

VIBRATORS, Concrete Block

BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.

•DESSER MFG. CO., Alpena, Mich.
 CANNON VIBRATOR CO., 1111 Power Ave., Cleveland 14, Ohio

THE CLEVELAND VIBRATOR CO., 2828 Clinton Ave., Cleveland 13, Ohio

•FLEMING MFG. CO., 4985 Fyler Ave., St. Louis, Mo.

GENERAL ENGINES CO., 307 Hunter St., Gloucester, N. J.

LIFETIME BUILDING SPECIALTIES INC., 519 Brook Haven Dr., Orlando, Fla.

•NEW HAVEN VIBRATOR CO., 145 Chestnut St., New Haven 7, Conn.

THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

•OSWALT ENGINEERING SERVICE CORP., 1335 Circle Ave., Forest Park, Ill.

•SPO INC., 7500 Grand Division Ave., Cleveland 25, Ohio

SOUTHEAST STEEL SALES CO., 437 N. Garland St., Orlando, Fla.

•SYNTRON CO., 450 Lexington Ave., Homer City, Pa.

VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside, L. I., N. Y.

VIBRATORS, Portable, Concrete

CANNON VIBRATOR CO., 1111 Power Ave., Cleveland 14, Ohio

•CHICAGO PNEUMATIC TOOL CO., 6 E. 44th St., New York 17, N. Y.

THE CLEVELAND VIBRATOR CO., 2828 Clinton Ave., W., Cleveland, Ohio

CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

COYLE & ROTH, 3024 S.E. 4th St. Minneapolis 14, Minn.

HENNEUSE ENGINEERING CO., Marion, Ohio

McMELITE CORP., 67 Riverdale Ave., Port Chester, N. Y.

•MULTIPLYX MACHINERY CORP., Elmore, Ohio

•NEW HAVEN VIBRATOR CO., 145 Chestnut St., New Haven 7, Conn.

THE PATTERSON FOUNDRY & MACHINE CO., 1250 St. George St., East Liverpool, Ohio

•SPO INC., 7500 Grand Division Ave., Cleveland 25, Ohio

STOW MANUFACTURING CO., 49 Shear St., Binghamton, N. Y.

•SYNTRON CO., 450 Lexington Ave., Homer City, Pa.

THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio

VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside, L. I., N. Y.

•VICTOR ENGINEERING CORP., 27 Maplewood Ave., Philadelphia 44, Pa.

•WESTERN MACHINERY CO., 760-765 Folsom St., San Francisco 7, Calif.

VOLTMETERS

THE BRISTOL CO., Waterbury 20, Conn.

•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

W

WAGONS, Dump

ATHEY PRODUCTS CO., 5631 W. 65th St., Chicago 38, Ill.

EASTON CAR & CONSTRUCTION CO., Easton, Pa.

•T-YE FRANK G. HOUGH CO., Sunnyside Ave., Libertyville, Ill.

•KOEHRING CO., 3026 W. Concordia Ave., Milwaukee 16, Wis.

LAPLANT-HOATE MFG. CO., INC., 2970 1st Ave. N.E., Cedar Rapids, Iowa

•R. G. LÉTOURNEAU, INC., 2301 N. Adams St., Peoria, Ill.

M-O-S MANUFACTURING CO., P.O. Box 336, Flora, Miss.

WOODRIDGE MANUFACTURING CO., Sunnyside, Calif.

WASHERS, Sand, Gravel, Stone (see Scrubbers)

WEIGH LARRIES

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

THE ATLAS CAR & MFG. CO., 1170 Ivanhoe Rd., Cleveland 10, Ohio

THE C. D. BARTLETT AND SNOW CO., 6700 Harvard Ave., Cleveland 5, Ohio

PELUMONT-BIRCH CO., 1503 Rare St., Philadelphia 2, Penna.

THE BRAY CONVEYORS CORP., 27 W. Jackson Blvd., Chicago 4, Ill.

•BUTLER RIN CO., Box 407, Waukesha, Wis.

•CHAIN BELT CO., 1600 W. Bruce St., Milwaukee 4, Wis.

DIFFERENTIAL STEEL CAR CO., Findlay, Ohio

•THE J. B. EHRMAN & SONS MFG. CO., Enterprise, Kans.

ERIE STEEL CONSTRUCTION CO., 67 Geist Rd. and N.P.R.R., Erie, Penna.

GIFFORD-WOOD CO., 1 Hudson Ave., Hudson, N. Y.

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.

THE HELTZEL STEEL FORM AND IRON CO., 1750 Thomas Road, Warren, Ohio

THE HOWE SCALE CO., Rutland, Vt.

THE JEFFREY MFG. CO., 935 N. 4th St., Columbus 16, Ohio

•LINK-BELT CO., 300 W. Pershing Road, Chicago 9, Ill.

•LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

MEYER SCALES, INC., 449 Central Ave., Orange, N. J.

•RICHARDSON SCALE CO., Van Houten Ave., Clifton, N. J.

STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STREETER-AMET CO., 4101 N. Ravenswood, Chicago 13, Ill.

TOLEDO SCALE CO., 1090 Telegraph Road, Toledo 12, Ohio

WEBSTER MFG. INC., Tiffin 16 Ohio

WINSLOW GOVT. STANDARD SCALE WKS., INC., 25th and Haythorne Ave., Terre Haute, Ind.

THE YALE & TOWNE MFG. CO., Philadelphia 15, Pa.

WEIGHT RECORDERS

THE BRISTOL CO., Waterbury 20, Conn.

BUILDERS-PROVIDENCE, INC., 345 Harris Ave., Providence 1, R. I.

THE CONVEYOR CO., 3260 East Slauton Ave., Los Angeles 11, Calif.

THE FOXBORO CO., Neponset Ave., Foxboro, Mass.

•HARDINGE CO., INC., 240 Arch St., York, Pa.

THE HELTZEL STEEL FORM & IRON CO., 1750 Thomas Rd., Warren, Ohio

HARDY SCALES CO., 5701 So. Atlantic Blvd., Maywood, Calif.

THE HOWE SCALE CO., Rutland, Vt.

•THE C. S. JOHNSON CO., P.O. Box 71, Champlain, Ill.

•MERRICK SCALE MFG. CO., 180 Autumn St., Passaic, N. J.

TOLEDO SCALE CO., 1090 Telegraph Rd., Toledo 12, Ohio

WELDING & CUTTING EQUIPMENT, Oxyacetylene

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y.

EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York 13, N. Y.

GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntingdon Sts., Philadelphia 32, Pa.

•JOSEPH T. RYERSON & SON, INC., 2558 W. 16th St., Chicago 80, Ill.

THE SIGHT FEED GENERATOR CO., P.O. Box 38, West Alexandria, Ohio

WELDING MACHINES, Arc

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y.

EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York 13, N. Y.

•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

•HARNISCHFEGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

HOBART BROTHERS CO., Hobart Square, Troy, Ohio

METAL & THERMIT CORP., 100 E. 42nd St., New York 17, N. Y.

SHEPPARD DIESELS, Philadelphia 15, Pa.

STERLING MACHINERY CORP., 411 Southwest Blvd., Kansas City 8, Mo.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

WELDING RODS & ELECTRODES

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y.

•ALLOY RODS CO., 3105 W. Market St., York, Pa.

THE AMERICAN BRASS CO., 25 Broadway, New York 4, N. Y.

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

THE CHAMPION RIVET CO., Harvard and E. 108th St., Cleveland 5, Ohio

EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York 13, N. Y.

•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

•HARNISCHFEGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

HOBART BROTHERS CO., Hobart Square, Troy, Ohio

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

METAL & THERMIT CORP., 100 E. 42nd St., New York 17, N. Y.

PAGE STEEL AND WIRE DIV. AMERICAN CHAIN & CABLE CO., INC., Monessen, Pa.

•RESISTO-LOY CO., 127 Baylis St., S. W., Grand Rapids 7, Mich.

STULZ-SICKLES CO., 134 Lafayette St., Newark 5, N. J.

•TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

WALL COLMONY CORP., 19345 John R. St., Detroit 3, Mich.

WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

WELDING RODS, Hard Facing

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y.

•ALLOY RODS CO., 3105 W. Market St., York, Pa.

AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

BERGEN MACHINE & TOOL CO., INC., 189 Franklin Ave., Nutley 10, N. J.

THE CHAMPION RIVET CO., Harvard and E. 108th St., Cleveland 5, Ohio

COAST METALS, INC., 1232 Camden Ave. S. W., Canton 6, Ohio

EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York 13, N. Y.

•GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N. Y.

•HARNISCHFEGER CORP., 4400 W. National Ave., Milwaukee 14, Wis.

HOBART BROTHERS CO., Hobart Square, Troy, Ohio

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

METAL & THERMIT CORP., 100 E. 42nd St., New York 17, N. Y.

PAGE STEEL AND WIRE DIV. AMERICAN CHAIN & CABLE CO., INC., Monessen, Pa.

•RESISTO-LOY CO., 127 Baylis St., S. W., Grand Rapids 7, Mich.

• A dot before name indicates advertiser in this issue. See advertiser index.

DIRECTORY

THE SIGHT FEED GENERATOR CO., P.O. Box 38, West Alexandria, Ohio

• **STOODY COMPANY**, 11929 E. Slouson Ave., Whittier, Calif.
STULZ-SICKLES CO., 134 Lafayette St., Newark 5, N. J.

• **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.
WALL COLMONDY CORP., 19345 John R. St., Detroit 3, Mich.
WESTINGHOUSE ELECTRIC CO., First Nat'l Bank Bldg., Pittsburgh, Pa.

WELDING SUPPLIES & ACCESSORIES

AIR REDUCTION SALES CO., 60 E. 42nd St., New York 17, N. Y.

ALBERT & J. M. ANDERSON MFG. CO., 289-305 A St., Boston 10, Mass.

AMERICAN OPTICAL CO., Mechanic St., Southbridge, Mass.

THE CHAMPION RIVET CO., Harvard and E. 108th St., Cleveland 5, Ohio

EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York 13, N. Y.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntingdon Sts., Philadelphia 32, Pa.

• **HARNISFEEGER CORP.**, 4400 W. National Ave., Milwaukee 14, Wis.

HOBART BROTHERS CO., Hobart Square, Troy, Ohio

METAL & THERMIT CORP., 100 E. 42nd St., New York 17, N. Y.

THE SIGHT FEED GENERATOR CO., P.O. Box 38, West Alexandria, Ohio

WILLSON PRODUCTS, INC., 248 Washington St., Reading, Pa.

WET PANS, Grinding (see Pans, Grinding)

WHEELS, Abrasive

CARBOLLOY CO., INC., 11177 E. Eight Mile Rd., Detroit 32, Mich.

THE CARBORUNDUM CO., REFRACTORIES DIV., Perth Amboy, N. J.

RAYBESTOS - MANHATTAN, INC., 61 Willett St., Passaic, N. J.

UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N. Y.

VICTOR ENGINEERING CORP., 27 Maplewood Ave., Philadelphia 44, Pa.

WHEELS, Tracklaying Type

ATHEY PRODUCTS CO., 5631 W. 65th St., Chicago 38, Ill.

HENNIEUSE ENGINEERING CO., Marion, Ohio

THE OLIVER CORP., INDUSTRIAL DIV., 19300 Euclid Ave., Cleveland 17, Ohio

WHIRLEYS

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

CLYDE IRON WORKS, INC., P. O. Box 370, Duluth 1, Minn.

McKIERMAN-TERRY CORP., 505 Manor Ave., Harrison, N. J.

WINCHES (see Capstans)

WIRE & CABLE, Electric (see Cable, Electric)

WIRE CLOTH

THE ABBEY-SCHERER CO., 304 Railroad St., El Monte, Calif.

BIXBY-ZIMMER CO., 961 Abingdon St., Galesburg, Ill.

THE CALIFORNIA WIRE CLOTH CORP., 1080 19th Ave., Oakland 6, Calif.

THE CAMBRIDGE WIRE CLOTH CO., Good Will Road, Cambridge, Md.

THE CLEVELAND WIRE CLOTH & MFG. CO., 3573 E. 78th St., Cleveland 5, Ohio

• **THE COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.

• **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.

HARRISTEEL PRODUCTS CO., Rm. 639, 420 Lexington Ave., New York 17, N. Y.

ROBINS CONVEYORS DIV., HE-WITT-ROBINS, INC., 270 Passaic Ave., Passaic, N. J.

• **IOWA MFG. CO.**, 916 16th St., N. E., Cedar Rapids, Iowa

KORB-PETTIT WIRE FABRICS & IRON WORKS, INC., 1505-15 N. Mascher St., Philadelphia 22, Pa.

LUDLOW-SAYLOR WIRE CO., 600 S. Newstead Ave., St. Louis 10, Mo.

MANGANESE STEEL FORGE CO., Richmond St. & Castor Ave., Philadelphia 34, Pa.

NATIONAL WIRE CLOTH CO., 252 W. Fairfield Ave., St. Paul 1, Minn.

OVERSTROM & SONS, 2213 W. Mission Road, Alhambra, Calif.

• **PIONEER ENG. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.

JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.

• **SIMPLICITY ENGINEERING CO.**, Durand, Mich.

• **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.

STAR WIRE SCREEN & IRON WORKS, 2515 San Fernando Rd., Los Angeles 65, Calif.

• **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.

TWIN CITY IRON & WIRE CO., 21-35 W. Water St., St. Paul 1, Minn.

THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio

• **WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CORP.**, 500 Fifth Ave., New York 18, N. Y.

WIRE ROPE

AMERICAN CABLE DIV., AMERICAN CHAIN & CABLE CO., INC., Wilkes-Barre, Pa.

AMERICAN STEEL & WIRE CO., Rockefeller Bldg., Cleveland 13, Ohio

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

BRODERICK & BASCOM ROPE CO., 4203 N. Union Blvd., St. Louis 15, Mo.

THE CALIFORNIA WIRE CLOTH CORP., 1080 19th Ave., Oakland 6, Calif.

• **THE COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

L. B. FOSTER CO., P. O. Box 1647, Pittsburgh 30, Pa.

HAZARD WIRE ROPE DIV., AMERICAN CHAIN & CABLE CO., INC., Wilkes-Barre, Pa.

INTERSTATE EQUIPMENT DIV., YARA ENGINEERING CORP., 13 W. Jersey St., Elizabeth 4, N. J.

JONES & LAUGHLIN STEEL CORP., Third Ave. & Ross St., Pittsburgh 30, Pa.

• **A. LESCHEN & SONS ROPE CO.**, 5909 Kennerly Ave., St. Louis 12, Mo.

• **R. G. LeTOURNEAU, INC.**, 2301 N. Adams St., Peoria, Ill.

• **MACWHYTE CO.**, 2949 14th Ave., Kenosha, Wis.

ROCHESTER ROPES INC., Culpeper, Va.

JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.

• **JOSEPH T. RYERSON & SON, INC.**, 2558 West 16th St., Chicago 80, Ill.

• **UNION WIRE ROPE CORP.**, 21st & Manchester Ave., Kansas City 3, Mo.

THE UPSON-WALTON CO., Perry Payne Bldg., Cleveland 13, Ohio

• **WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CORP.**, 500 Fifth Ave., New York 18, N. Y.

WIRE ROPE CORP. OF AMERICA, INC., 464 Congress Ave., New Haven, Conn.

WIRE ROPE FITTINGS, Clamps, Clips, Cutters, Hooks, Sockets, Etc.

AMERICAN CABLE DIV., AMERICAN CHAIN & CABLE CO., INC., Wilkes-Barre, Pa.

AMERICAN HOIST & DERRICK CO., 63 S. Robert St., St. Paul 1, Minn.

AMERICAN MANGANESE STEEL DIV., AMERICAN BRAKE SHOE CO., 377 E. 14th St., Chicago Heights, Ill.

AMERICAN STEEL & WIRE CO., Rockefeller Bldg., Cleveland 13, Ohio

BAER STEEL PRODUCTS, INC., P.O. Box 497, Auburn, Wash.

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

BRODERICK & BASCOM ROPE CO., 4203 N. Union Blvd., St. Louis 15, Mo.

CHICAGO STEEL FOUNDRY CO., 3720 So. Kedzie Ave., Chicago 32, Ill.

• **THE COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.

CONNELLSVILLE MFG. & MINE SUPPLY CO., P.O. Box 673, Connelville, Pa.

DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.

ELECTRIC STEEL FOUNDRY CO., 2141 N. W. 25th Ave., Portland 10, Ore.

FARRELL - CHEEK STEEL CO., Sandusky, Ohio

HAZARD WIRE ROPE DIV., AMERICAN CHAIN & CABLE CO., INC., Wilkes-Barre, Pa.

JONES & LAUGHLIN STEEL CORP., Third Ave. & Ross St., Pittsburgh 30, Pa.

• **THE THOMAS LAUGHLIN CO.**, 143 Fore St., Portland 6, Me.

T. H. LEWTHWAITE MACHINE CO., 319 E. 47th St., New York 17, N. Y.

THE LOOMIS MACHINE CO., 15 E. Market St., Tiffin, Ohio

• **MACWHYTE CO.**, 2949 14th Ave., Kenosha, Wis.

MONTGOMERY & CO., INC., 53 Park Place, New York 7, N. Y.

MORSE - STARRETT PRODUCTS CO., 1204 Forty-Ninth Ave., Oakland 1, Calif.

ROCHESTER ROPES INC., Culpeper, Va.

JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.

• **SAUERMAN BROS., INC.**, 530 S. Clinton St., Chicago 7, Ill.

• **TAYLOR - WHARTON IRON & STEEL CO.**, High Bridge, N. J.

THE UPSON-WALTON CO., Perry Payne Bldg., Cleveland 13, Ohio

• **WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CORP.**, 500 Fifth Ave., New York 18, N. Y.

WIRE ROPE CORP. OF AMERICA, INC., 464 Congress Ave., New Haven, Conn.

INTERSTATE EQUIPMENT DIV., YARA ENGINEERING CORP., 13 W. Jersey St., Elizabeth 4, N. J.

WIRE ROPE DRESSING COMPOUNDS (see Lubricants)

WIRE ROPE, Slings

AMERICAN CHAIN & CABLE CO., INC., Wilkes-Barre, Pa.

AMERICAN STEEL & WIRE CO., Rockefeller Bldg., Cleveland 13, Ohio

BETHLEHEM STEEL CO., E. Third St., Bethlehem, Pa.

BRODERICK & BASCOM ROPE CO., 4203 N. Union Blvd., St. Louis 15, Mo.

THE CALIFORNIA WIRE CLOTH CORP., 1080 19th Ave., Oakland 6, Calif.

• **THE COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.

DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.

L. B. FOSTER CO., P. O. Box 1647, Pittsburgh 30, Pa.

• **A. LESCHEN & SONS ROPE CO.**, 5909 Kennerly Ave., St. Louis 12, Mo.

• **MACWHYTE CO.**, 2949 14th Ave., Kenosha, Wis.

ROCHESTER ROPES INC., Culpeper, Va.

JOHN A. ROEBLING'S SONS CO., 640 S. Broad St., Trenton 2, N. J.

• **UNION WIRE ROPE CORP.**, 21st & Manchester Ave., Kansas City 3, Mo.

THE UPSON-WALTON CO., Perry Payne Bldg., Cleveland 13, Ohio

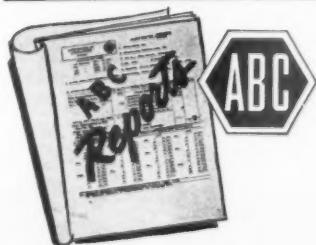
• **WICKWIRE SPENCER STEEL DIV., THE COLORADO FUEL & IRON CORP.**, 500 Fifth Ave., New York 18, N. Y.

WIRE ROPE CORP. OF AMERICA, INC., 464 Congress Ave., New Haven, Conn.

• A dot before name indicates advertiser in this issue. See advertiser index.

Advertisers—How does your selection of Business Papers as advertising media score on this test?

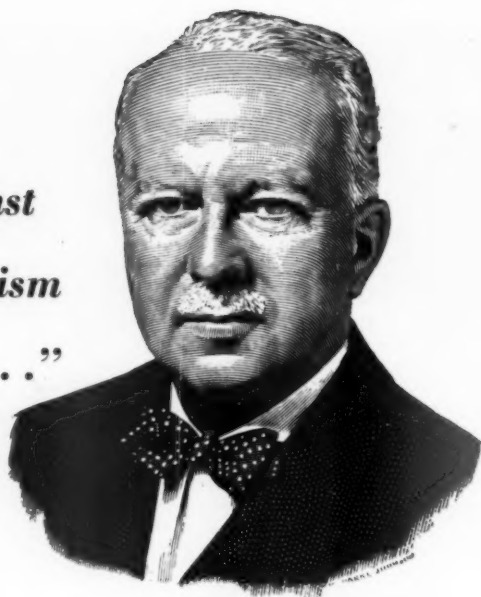
QUESTIONS	YES OR NO	COMMENTS
Does your selection of media start on a basis of facts; namely, has the circulation been audited by an accepted authority in accordance with standards approved by leading advertisers and agencies?		The Audit Bureau of Circulations, an association of 3300 advertisers, agencies and publishers, provides standards and methods for auditing the circulations of published media. All publications that can meet A.B.C. standards are eligible for membership.
Paid subscriptions as indication of reader interest. Do you take this factor into consideration in evaluating the circulations of business papers?		A.B.C. Audit Reports give the average circulation, both paid and unpaid, for the period covered by the report.
Does your consideration include an audited breakdown of the subscribers by occupation and kind of business?		A.B.C. business paper reports show the vocational identity of subscribers and tell how much of the circulation goes to the specialized markets in which you are interested.
Do you compare the geographic distribution of the circulation with your sales activities and market potentialities?		For business papers in the U. S., A. B. C. reports give a breakdown of subscribers by states—for Canadian papers by Provinces—thus making it possible to compare coverage with analyses of sales and with distribution of other publications.
In evaluating media, do you take into consideration the channels through which the circulation is obtained?		A.B.C. reports show how many subscriptions were received by mail direct from subscribers, how many from catalog agencies, publisher's own and other field-selling organizations.
Do you check to find out how much, if any, of the circulation is sold at special reduced prices; or in connection with premiums?		When special reduced prices or premiums are used in obtaining subscriptions, A. B. C. reports show what these prices and premiums are and the number of subscriptions thus obtained.
In selecting business papers, do you check to see what percentage of the subscribers express continued interest in the publications by renewing their subscriptions?		A.B.C. reports for business papers give the percentage of renewals based on the number of expirations during a 12-month period and the renewals received within 6 months after expiration.
Do you study a paper's circulation growth over a period of years as an indication of publishing stability and progress?		A.B.C. reports show quarterly averages of the net paid circulation for the period covered by the report and for 3 years previously.



When you buy advertising space with the help of the factual information in A. B. C. reports you make sure of maximum value for your advertising dollars. This business paper is a member of the Audit Bureau of Circulations. Ask for a copy of our A. B. C. report and then study it.

ROCK PRODUCTS

*"The immunizer against
the disease of communism
is a certain feeling . . ."*



MR. WALTER S. GIFFORD

"It is the feeling of a man who owns a home, a bank account, an insurance policy. It is the feeling that an employee on the Payroll Savings Plan has when he gazes at his accumulation of Savings Bonds and realizes that here is palpable evidence that he has made a profit on his job—that the profit system works for him as well as for his employer."

Mr. Gifford has believed in—and worked for—payroll savings plans for thirty-seven years—since 1913, when, as Statistician of the A. T. & T., Mr. Gifford developed a payroll savings plan for the purchase of A. T. & T. stock.

In 1938, A. T. & T. employees were offered a Payroll Savings Plan for the purchase of U. S. Savings Bonds. To date, Bell System employees have invested **more than half a billion** dollars in savings bonds—with a maturity value in excess of \$675,000,000.

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measure the important feeling of ownership shared by the Americans who own 56 billion dollars in U. S. Savings Bonds (against 45 billions at the end of the war!).

Every Payroll Savings Plan is a reflection of the vision and enthusiasm of the top executive of the company. If he gets behind it, **personally**, employee participation is high—to the benefit of the country, the company and the employee. If the interest of the Big Boss is active—participation may very well exceed the 50% mark. The top man is the key man in a Payroll Savings Plan.

Get in touch with your State Director, Savings Bond Division, U. S. Treasury Department. He will help you put in a plan . . . or he will show you how to increase employee participation—without undue effort or high pressure tactics.

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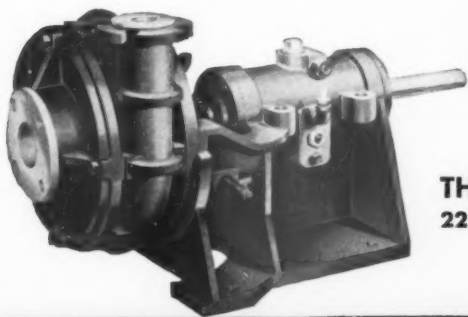
ROCK PRODUCTS



THE CHAMP WEIGHS IN ...after the fight

FOR two and a half years, the Hydroseal Sand Pump from which this impeller was taken gave continuous service with no appreciable loss in efficiency, capacity, or head... and when the impeller was removed for inspection, the engineers were surprised to find that it was only slightly worn. Day in and day out, the pump had delivered approximately 325 tons of minus 20-mesh silica sand per hour in a 1650 G.P.M. solution against a static head of 14 feet. Yet, after more than a million tons, it still had plenty of service left.

Records like this have made Hydroseals the world-champions in all classes of abrasive pumping from flyweight (AA-Frame) to heavy-weight (G-Frame). So don't forget... plant operators who demand the most from materials-handling pumps wisely choose Hydroseals.



This Maxmix Rubber Impeller tip removed at 394 lbs., having lost only 14 lbs. in pumping 1,663,312 tons of sand. The reason, obviously, is the use of Maxmix Rubber, allowing it to stand the useful life of equivalent metal parts.



HYDROSEALING

Clear sealing water keeps abrasives from leaking back thru the annular clearances between the rotating impeller and the stationary side plates. This reduces wear to a minimum and gives uniform efficiency throughout the life of the pump.

THE ALLEN-SHERMAN-HOFF CO.

221 S. 15th Street • Philadelphia 2, Pa.

Representatives in Most Principal Cities

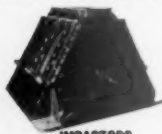
HYDROSEAL

SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

PENNSYLVANIA

A CRUSHER FOR EVERY CRUSHING PROBLEM IN THE PIT AND QUARRY INDUSTRIES



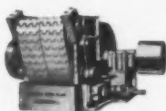
IMPACTORS

Reversible rotation. Reduces by direct impact at controlled slow speeds.



HAMMERMILLS

Reversible and Non-Reversible types. Manufactured in many sizes.



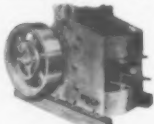
DIXIE NON-CLOG

Patented Non-Clog Moving Breaker Plate eliminates troubles when crushing wet or sticky materials.



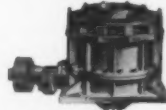
SINGLE ROLL CRUSHERS

For primary and secondary reduction. Wide range of capacities.



JAW CRUSHERS

KUE-KEN Crushers that employ the principle of "crushing without rubbing."



GYRACONE CRUSHERS

KUE-KEN Gyracone Crushers also employ "crushing without rubbing" principle.

Every crushing problem differs in one or more of its principal factors and no one type of crusher can meet all of them. For this reason the Pennsylvania-Dixie line is large and varied. Pennsylvania is not compelled to rely on one or two types of crushers, which assures you that our recommendation will be the most efficient and economical for your requirements.

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